SCHOOL OF ORIENTAL AND AFRICAN STUDIES
(UNIVERSITY OF LONDON)
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SOME ASPECTS OF THE POPULATION AND URBAN GEOGRAPHY OF AN ISLAND REPUBLIC: THE CASE STUDY OF SINGAPORE SINCE 1957

By M.K. Yeo

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

ABSTRACT

The main aim of this study is to examine the urban and related population problems of Singapore; to analyse the demographic structure, social and economic characteristics of the population and to describe the system of housing and urban renewal schemes. An attempt is also made to describe the various interrelationships between the public housing development, the urban renewal and the population problems in Singapore.

The main four findings of study are as follows. First, under immigration control and the Singapore National Family Planning and Birth Control Policy it is hoped possible that the population will be settled down into a more stable population and the two-child family will be accepted as the social norm. Secondly, in comparing the present housing conditions and development with those of the past it is clear that before 1960 most of the housing for low-income groups consisted of crowded tenements in Chinatown; the middle income groups were typified by the Singapore Improvement Trust flats in Tiong Bahru and Alexandra Road; and both these groups were living in single-storey to triple-storey buildings. After 1960, most of the public housing has been multi-storey flats, particularly for the lower-income groups of the population. Thirdly, Singapore's current dynamic urban renewal programme is being promoted against this background, and the city skyline is being dramatically transformed. Finally, it is hoped that the success of Singapore's multi-racial experience will have a contribution to make to all multi-racial societies, especially in Southeast Asia.

ACKNOWLEDGEMENTS

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CHAPTER 1

INTRODUCTION

In 1963, when Singapore was separated politically from Malaysia, it became a very small nation, both in its area and in its resources. Yet it is clear that small size need not necessarily mean a low level of development. Taking selected countries of the world with population of less than 10 million and areas of 40,000 sq.km or less (Table 1.1), it is plain that such countries may develop manufacturing industries, service industries, and more especially entrepot trade of large proportions.

The Republic of Singapore is the smallest and newest country in Southeast Asia, with a total land area of only 586 sq.km (226.5 sq.miles). Singapore consists of the island of Singapore 542.5 sq.km (209.5 sq.miles) and some 54 smaller islands (38.8 sq.km or 15 sq.miles) and reclaimed land (5.1 sq.km or 1.2 sq.miles). Singapore is 14 miles from north to south and 26 miles from east to west; its size is thus about the same as that of the Isle of Wight in England. Singapore is in an ideal situation to become a main pivotal port. It lies between 1°09'N and 1°29'N latitude and 103°38'E and 104°06'E longitude, it is therefore sited at the southern tip of the West Malaysian Peninsula and is separated from the mainland by a narrow strait about three quarters of a mile in width; at the same time the Republic lies in the midst of the greatest archipelago in the world, consisting of the Republic of Indonesia, the Federation of Malaysia and the Philippines. Singapore, Strategically situated right in the centre of the region of Southeast Asia, has long been a commercial centre in this area. Moreover, because it stands on the route from Japan to the Middle East, Singapore has become the cross-roads of major oceans routes between the Indian and the Pacific Oceans. Advantages of location have thus undoubtedly exerted a great influence on its role in international trade.

This study is centred on the population, public housing and urban development of Singapore since 1957. At independence, Singapore's new government began a frontal attack on several problems: rapid population

Table 1.1

Area, Population, Density and External Trade of Selected Small Territories in 1969

Country	Area (sq.km)	Population Census Date	Population Total (1,000)	Population density (Per sq.km)	External Trade (Million U.S. $ ¤) Imports	Exports
Brunei	5,765	10.8.60	116	20	72	85
Kuwait	16,000	25.4.65	570	36	646	1,476
Monaco	2	1.3.68	23	15,436	N.A	N.A
Macau	16	15.12.60	260	16,250	N.A	N.A
Nauru	21	30.6.60	7	310	N.A	N.A
Switzerland	41,288	1.12.60	6,224	151	5,285	4,625
Hong Kong	1,034	7.3.61	3,990	3,859	2,457	2,178
Singapore	586	22.6.70	2,017	3,471	2,040	1,549

Sourse: United Nation, Statistical Yearbook, 1970, New York. 1971.

N.A. Not Available

¤ Average exchange rates for Singapore dollars in 1969 were as follows: U.S.$1=S$3.06

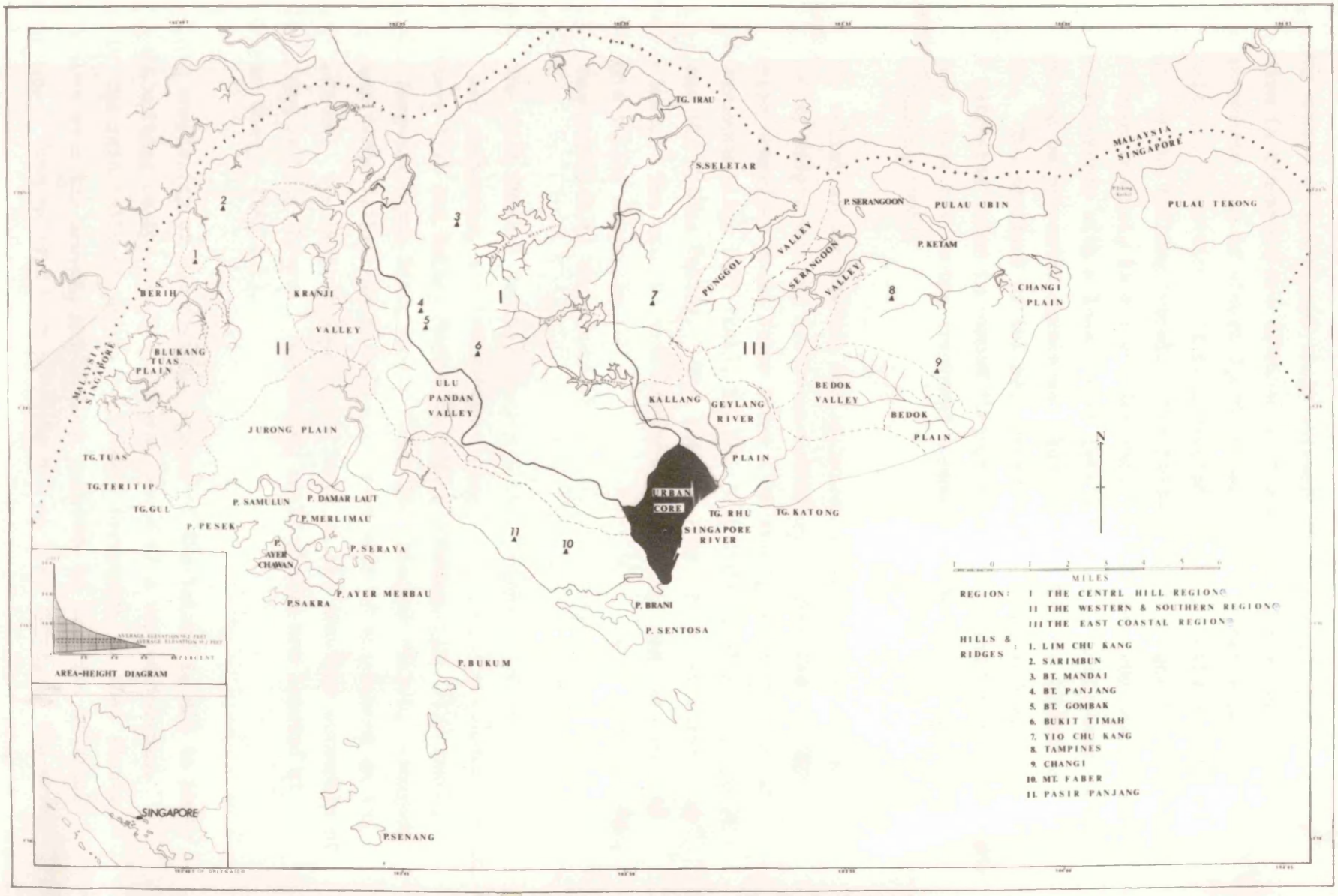
£1 Stg=S$7.344

growth, public housing development, urban renewal and reclamation scheme. Within a decade the country had undergone a transformation in all these aspects. For the purpose of exposition, the geographical features and climatic characteristics are explained in the first section. In the second section a description of the growth and density of population is given. In the third section there is an analysis of some demographic problems, and the fourth section is an interpretation of the public housing development. The final section explains the problems of urban development.

(i) Relief and Geology

Singapore is a small tropical island and although it has physical features on a small scale, its relief and rivers vary greatly in character. The whole country is of very low elevation and generally undulating with a low range of hills, the highest of which is 581 feet above sea level in Bukit Timah to the north-west of the city. Otherwise, the island has no striking geographical features. Hills, valleys, ridges and plains are the common surface forms on the island. Out of a total area of 209.5 sq. miles (main Singapore island), almost 64 per cent of its area is below 50 feet, but only 10 per cent of the island is 50.20 feet of average elevation and its median elevation is 39.21 feet (Wong,b1969). The coast-line is indented by broad estuaries tending to become mangrove swamps and separating numerous capes or tanjong. Johore Straits has a width of about a mile, broadening towards the east.

The island may be divided into three major distinct regions:
(a) The Central Hill Region with heavy deposits of granite in Bukit timah (581 feet, 1.28 sq.miles), Bukit Panjang (434 feet, 1.96 sq.miles), Bukit Mandai (422 feet, 0.87 sq.miles), and Bukit Gombak. The central plateau area of about 13 sq. miles has been marked off as a catchment area and a natural reserve. On the main central mass the relief is low, round and smooth, in general not rising above 200 feet. The surface tilts toward the east, the highest point being near the southwest. Bukit Timah "the hill of tin" is just under 600 feet. Short winding rivers run from near the centre of the island in all directions to the coast, forming



MAP 1.1 : PHYSICAL LANDSCAPE OF SINGAPORE

mangrove swamps at and around their entrance to the sea. The three reservoirs in Singapore are situated in the centre of the island with a total catchment area of almost 7,600 acres. The largest reservoir is the MacRitchie Reservoir. It is connected to the slightly smaller Pierce Reservoir by the Kallang Tunnel. The latter, which is really part tunnel and part open channel, is a diversion that has reached "top water-level" into the reservoir with a lower water level. Thus loss of water through overflow can be prevented except when both reservoirs are filled to capacity. The smallest of the reservoirs is the Seletar Reservoir and from it untreated water is pumped through a main pipe into Pierce Reservoir and thence drawn off to the treatment works. (Geno-Oehlers and Rudolph Wikkramatileke, 1968).

(b) The relief of the western and southern part of the island is dominated by ridges tending northwest-southeast. This Western Hill and Vale Region comprises Mount Faber Ridge (345 feet), Pasir Panjang (270 feet), Serimbun Ridge (277 feet), Lim Chu Kang Ridge (286 feet), Kranji Valley and Ulu Pandan Valley. The two plains are found at Jurong and Blukang Tuas. The extreme southwest of the granite area is succeeded first by a valley along the contact zone and then by the Mt. Faber Ridge, which runs parallel to the coast and is generally high.

(c) The East Coastal Region, consisting of fertile alluvium (sand and gravel) and sediments, stretches from Katong to the Bedok and Changi areas. The Eastern Hill and Valley Region comprises Tampines Hill (138 feet), Yio Chu Kang-Serangoon Hill, Changi-Bedok Hill Punggol Valley, Serangoon Valley and Bedok Valley and the plains occupy half of the island on the Eastern Coast; the largest plains are found at the combined estuaries of Kallang and Geylang Rivers. Elsewhere, small plains are located at Bedok and Changi (Map 1.1).

The complexity of the drainage system of the island is due to heavy rainfall working on the deeply weathered rocks of a varied terrain. Most of the rain falls in short, very heavy downpours, so that sheets of water move over the ground, reddened of yellowed by the fine material picked up. Some valleys have channels cut on both sides, at the break

of slope, which completely remove water from the middle to the side of the valley. Many of the river are short and would be better designated as streams. Some of the streams are intermittent. Some of the largest rivers are Sungei Serangoon, Sungei Punggol, Sungei Seletar, Sungei Kranji which flow into the Johore Strait; Sungei Jurong, Singapore River and Kallang River flow into the Singapore Strait. The smaller rivers are Sungei Changi, Sungei Tampines, Sungei Sembawang and Sungei Bedok. Sungei Seletar is the laongest river system (about nine miles long) and headwaters from this and two other streams have been impounded from its source through Seletar Reservoir to the Johore Straits.

A characteristic feature of the larger streams on the island is the wide estuary which is largely colonized by mangrove swamp. They include extensive stretches at Jurong, Kallang and Changi to fringing estuarine swamps and isolated pockets in small valleys and along coastal indentations. Singapore island itself is ringed by mangrove swamps and parts of the island are still covered with marshy jungle, much of which is primary jungle and swamps of the low-lying areas such as Kranji, Seletar, Tuas and Tampines areas. To the south of Singapore the mangrove swamps are still being cleared for land reclamation, especially for the development of Keppel Harbour and the expansion of the settlement towards Kallang Basin. About 13 per cent of the swamps in Jurong were reclaimed for prawn culture. The various swamp reclamation schemes have brought about a decrease in the island's swamp areas. In 1958 nearly 20 sq. miles were under swamps; this decreased to 17.28 sq. miles in 1963 and 13.93 sq. miles in 1966 (Wong, 1969a).

About two dozen of the small islands within Singapore's territorial waters are sizeable and inhabited. To the northeast of the island of Singapore lie several groups of islands at the Johore Straits. They are Pulau Serangoon, Pulau Ubin (3.92 sq. miles), and the largest is Pulau Tekong in the east with a land area of close to seven sq. miles. To the southwest of Singapore lie several small groups of islands, such as Pulau Samulun, Pulau Damar Laut and Pulau Ayer Chawan. To the south of Singapore island is a large collection of small islands in the Singapore Straits. The major ones are Pulau Sentosa (1.11 sq. miles), Pulau Brani and Pulau Bukom (0.29 sq. miles), the former fortress guarding the sea approaches to Singapore (Map 1.1).

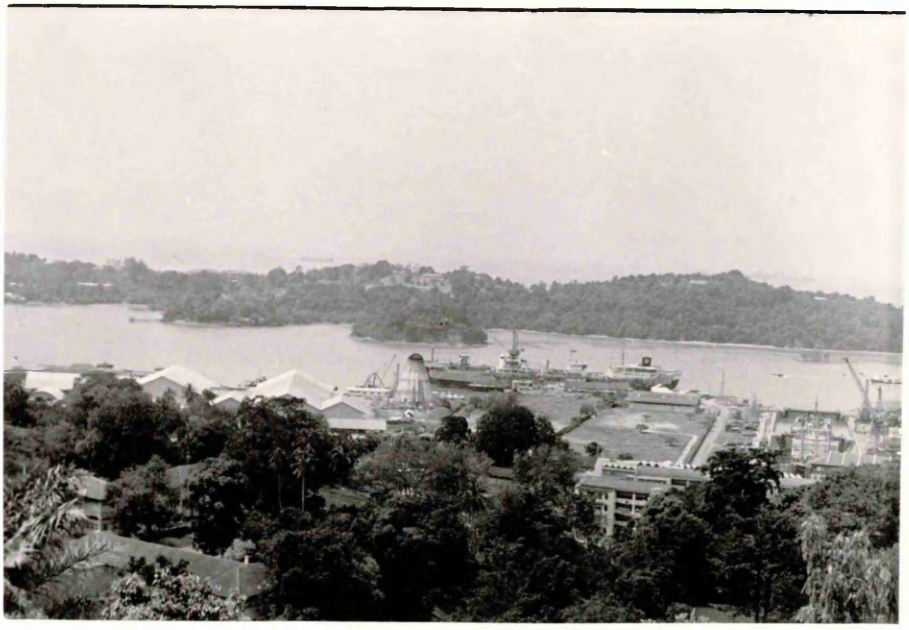


Plate 1.2: Pulau Sentosa View from Mount Faber

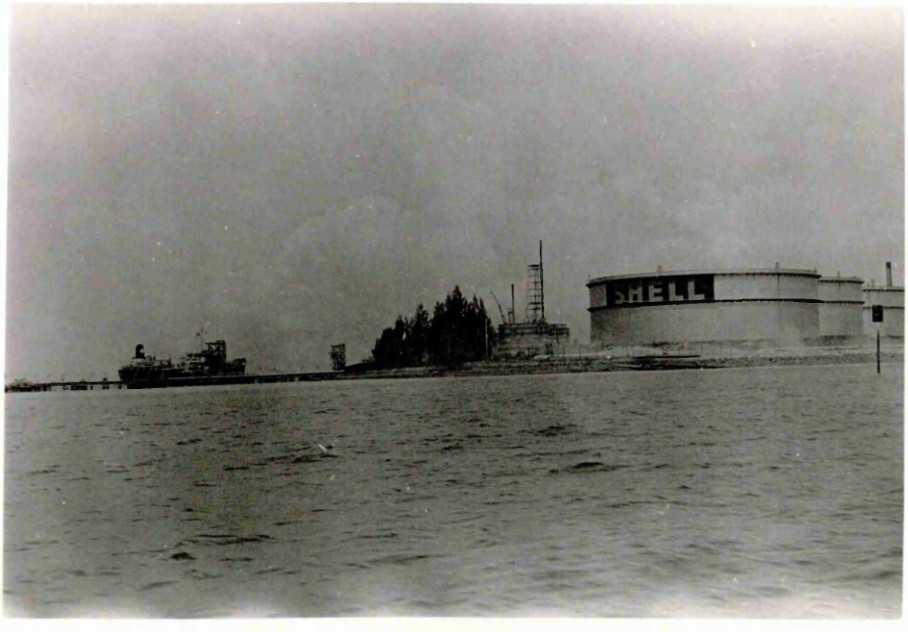
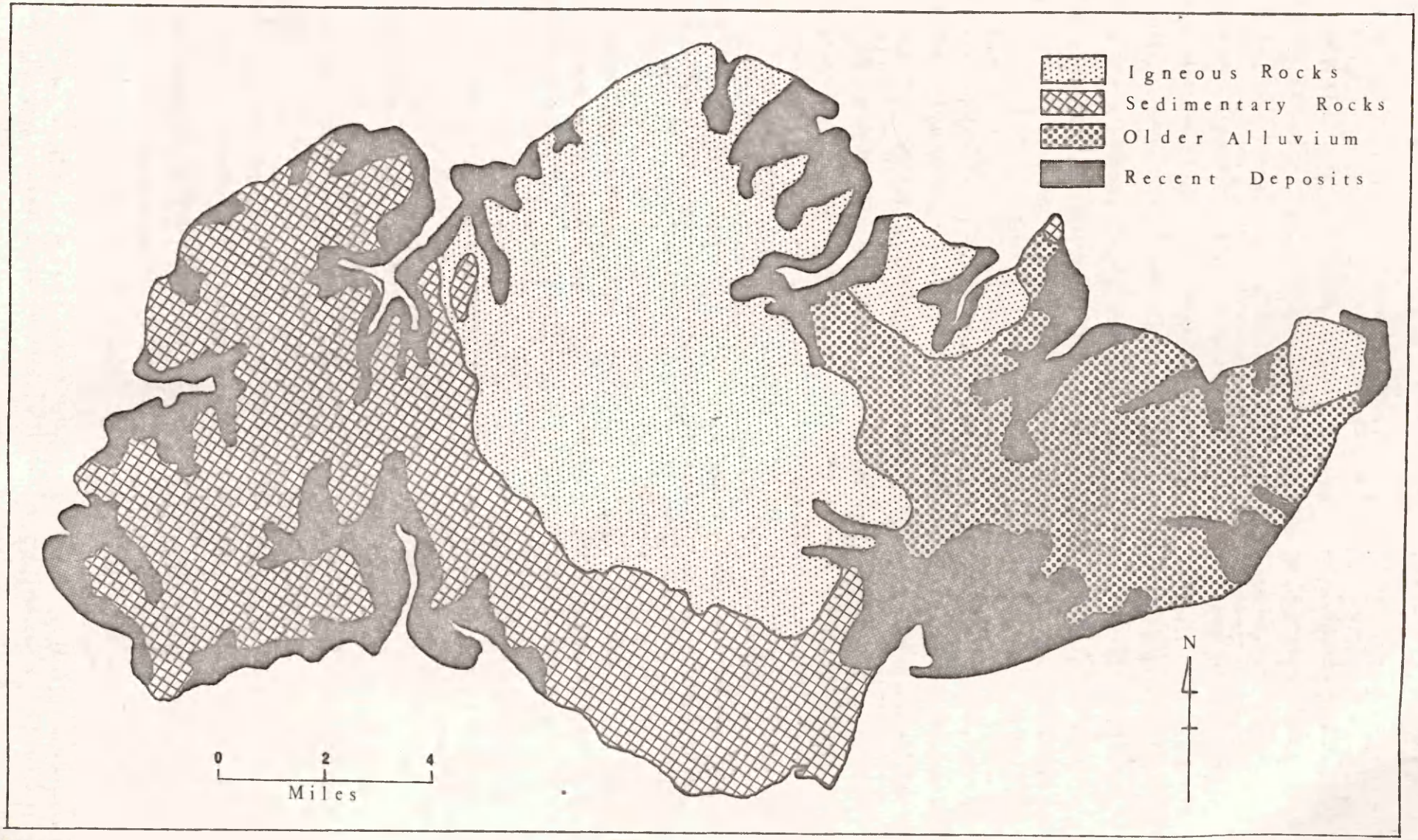


Plate 1.3: Pulau Bukom Oil Refinery

The structure of the islands is composed of four groups of rocks, each occurring in well-defined areas. These major groups are as follows: Igneous rocks have intruded into the sedimentary top strata. From the general dip of the granite-sedimentary boundary it is possible that the granite sedimentary rocks were already tilted in a general westerly and southwesterly direction. The main varieties are norite, granite, diorite and granite-norite of granite-diorite hybrids. The granite outcrops do not show prominently at the surface; and although in other parts of Malaysia, granite and derived alluvials are noted for tin, very little tin in either vein or placer form is found on Singapore island. Granite underlies more than half of the island; Singapore is particularly fortunate in this respect as there are abundant deposits of good quality granite in the central part of the island. Bukit Timah is now extensively quarried for structural stone and only in the quarries can granite be seen; as elsewhere, the cover of wearhered rock may be as thick as 40 feet (Dobby, 1940). Apart from this batholith, another intrusion is at the Changi district. It is a small outcrop of granite at the extreme eastern tip of the island which more than 10 organisation are quarrying at more than 20 sites in Singapore as well as on the off-shore island of Pulau Ubin.

The sedimentary rocks show obvious signs of contact metamorphism near the granite. Along the granite-sedimentary boundary the strata are shattered into blocks and a few are tilted in all directions. The strata dip toward the south and southwest and are folded in a complex fashion and faulted; they form a landscape dominated by ridges running in NW-SE and NNE-SSW directions (Wong, 1969). Sedimentary rocks are found in the western and southern parts of the island and a small group is located at the Ponggol Peninsula. These sedimentaries consist mainly of shale, sandstone and conglomerate. To the extreme southwest of Mt.Faber is an erosion scarp broken by transverse valley incisions. This scarp can be recognized beyond Keppel Harbour in the Island Sentosa (Dobby, 1940). The western part of Singapore has very good deposits of red clay suitable for the manufacture of first-class bricks.



MAP 1.2 : GEOLOGY OF SINGAPORE

The third major structural unit, a hundred-feet platform of alluvial debris, lies east of the granite shield. It is a poorly sorted mass of semi-consolidated sand, gravel and pebble beds with some clay. The alluvium was deposited by one of the previous drainage systems of the Malayan mainland, when it was part of the Sunda platform. It has been intensely dissected by streams into a series of hills and spurs (Wong, 1969). Contemporary alluvials extend over a large part of the island, the broad, mangrove-bordered estuaries repeating the general shallowness of the relief. The dark muds of the river deposits have a high humus content and towards the river mouths, sands enter into their composition and lighten the texture. The eastern part of Singapore has extensive deposits of sand and this area is able to meet the demands of the building industry for almost three-quarters of the year. ~~During the dry seasons,~~ The supply of sand to the Singapore building industry has to be supplemented by sand from the southern states of Malaysia.

The recent deposits, which are composed mainly of sand, clay, gravel, mud and pebble beds and coral, were laid down by the streams of the island. The estuaries are colonized by mangrove swamps which extend inland along the valley. The soil of the swamps have a high organic matter content in the first three to five feet. Further down there is more clay. Towards the landward margin the soils are mixed with freshly eroded materials. Similarly, in the east the swamps in the valleys of Sungei Serangoon and Sungei Kallang are formed and almost completely obscure the boundary between the central batholith and older alluvium areas (Map 1.2.).

(ii) Climatic characteristics

The Republic of Singapore is situated 85 miles north of the equator. The climate is characterized by lowland equatorial conditions in most respects and there is no marked seasonal change throughout the year. The island republic's climate is characterised by uniform temperature, high humidity and copious rainfall. Although the days are hot and, on account of the high humidity, somewhat oppressive, the nights are usually cool. Although typhoons are frequently born as shallow depressions in

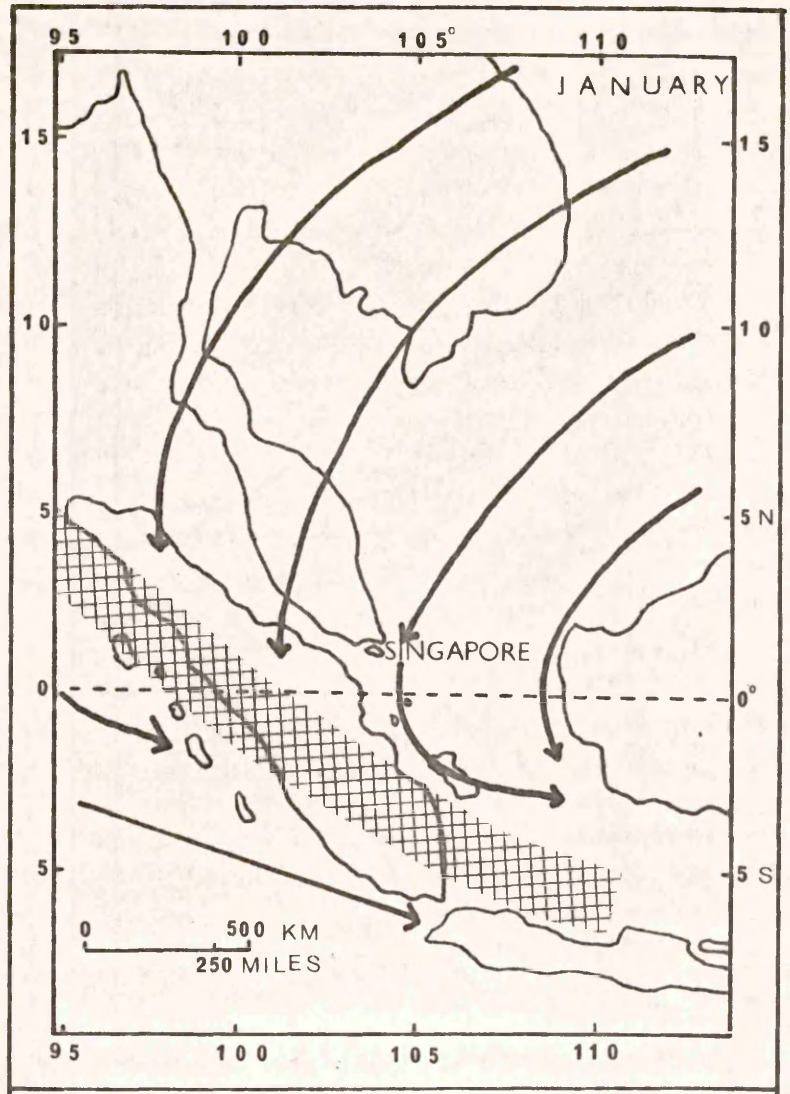
the South China Sea, no typhonic phenomena touch Singapore. Generally, Singapore's climate is equable and pleasant because of the modifying effects of the sea. The wind pattern is greatly influnced by the system of the Southeast Asia Monsoons, which dominates the general circulation in this part of the world. Based on the monsoons, Singapore experiences four main seasons:

(a) The Northeast Monsoon starts in December and continues until March (Map1.3.1.). This season brings large amounts of rainfall, especially in December and January. The air masses which are carried to Singapore by the northeast monsoon come originally from Siberia or the North Pacific. There they were cold and stable, but on their long journey to the equatorial regions they become thoroughly warmed and humidified especially over the warm South China Sea.

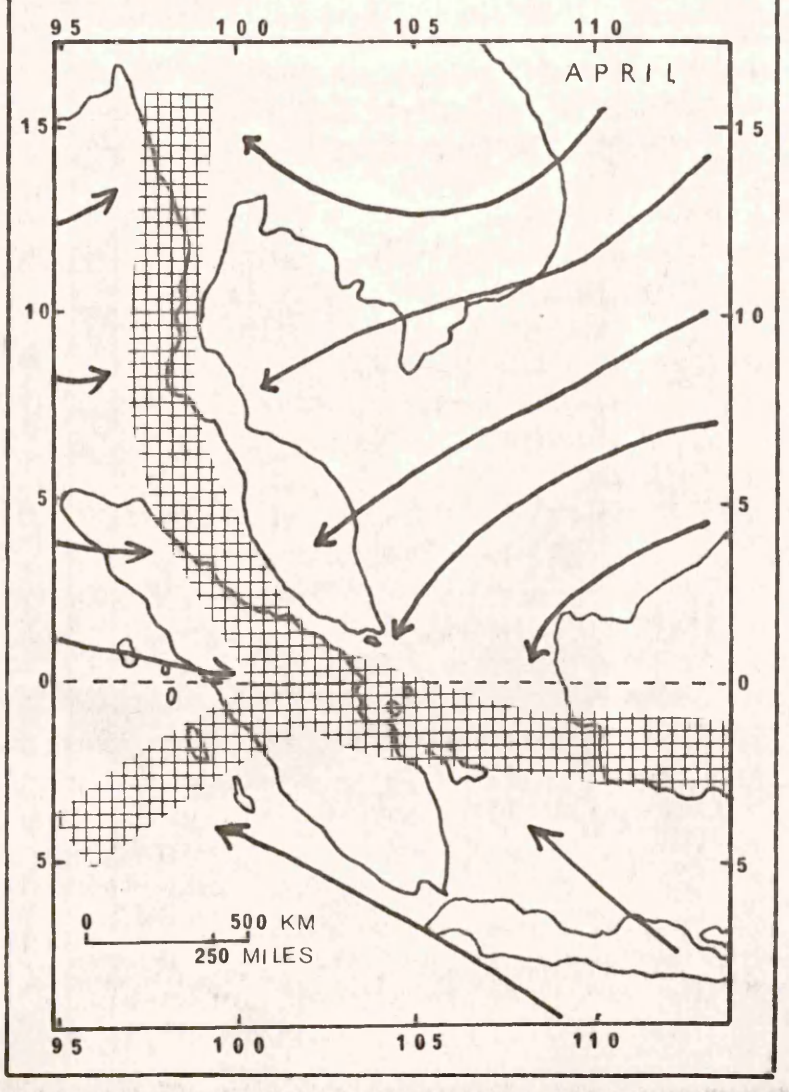
(b) The Inter-Monsoon Period normally comes during April (Map 1.3.2). The air-mass boundary between the slowly retreating and weakening northeast monsoon and the advancing southwest monsoon is often near Singapore during this year. The wind directions are very changeable and wind velocities are low; the weather in this period is mainly controlled by the general convergence of air-masses in the area.

(c) The Southwest Monsoon is aloft from may to september (Map 1.4.1). The Southwest monsoon consists of two branches: the first comes from the South Pacific and Australia; the second branch of the Southwest Monsoon is formed by the equatorial westerlies from the Indian Ocean. In Singapore the main source of rainfall during this period is the convergence zpne between the two branches of the Southwest Monsoon. This air mass boundary is very changeable in position and is rarely over Singapore for long.

(d) A Second Inter-Monsoon Period occurs during October and November (Map 1.4.2). Sometimes the movement of the air mass boundary may stop or even be temporarily reversed, but by the middle of November or the beginning of December the northeast monsoon is usually well established over Singapore. Some disturbances of the Sumatra type occur in Singapore;

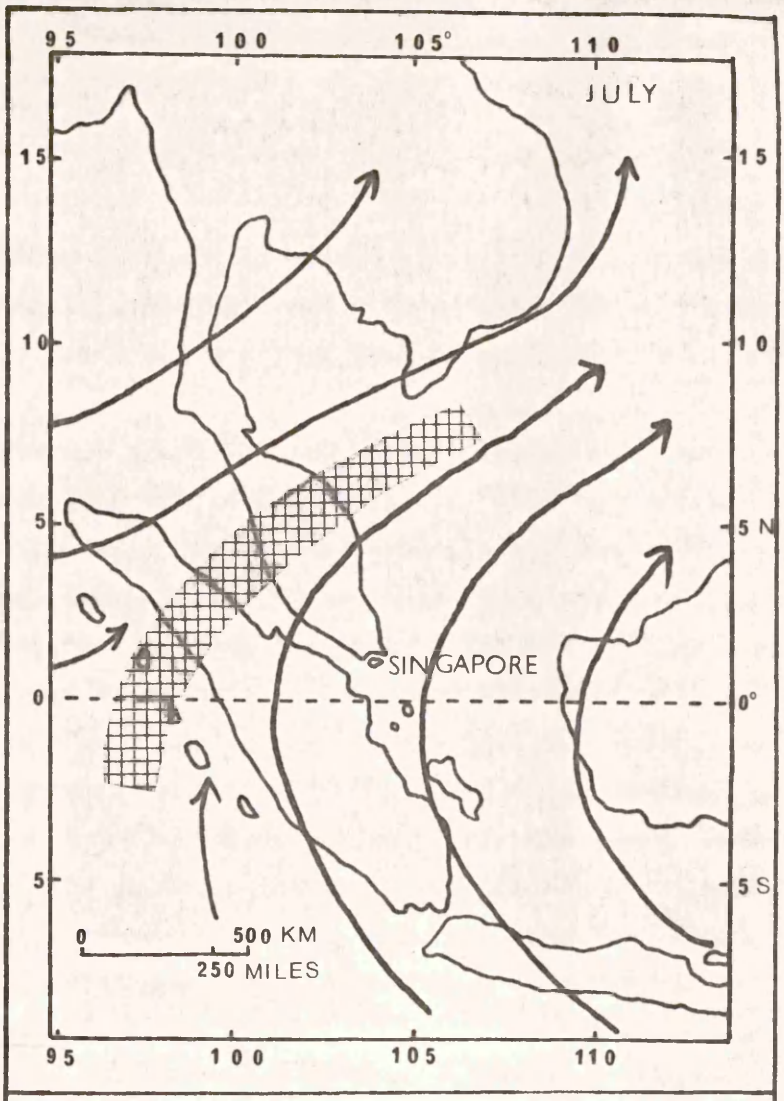


MAP 13.1.

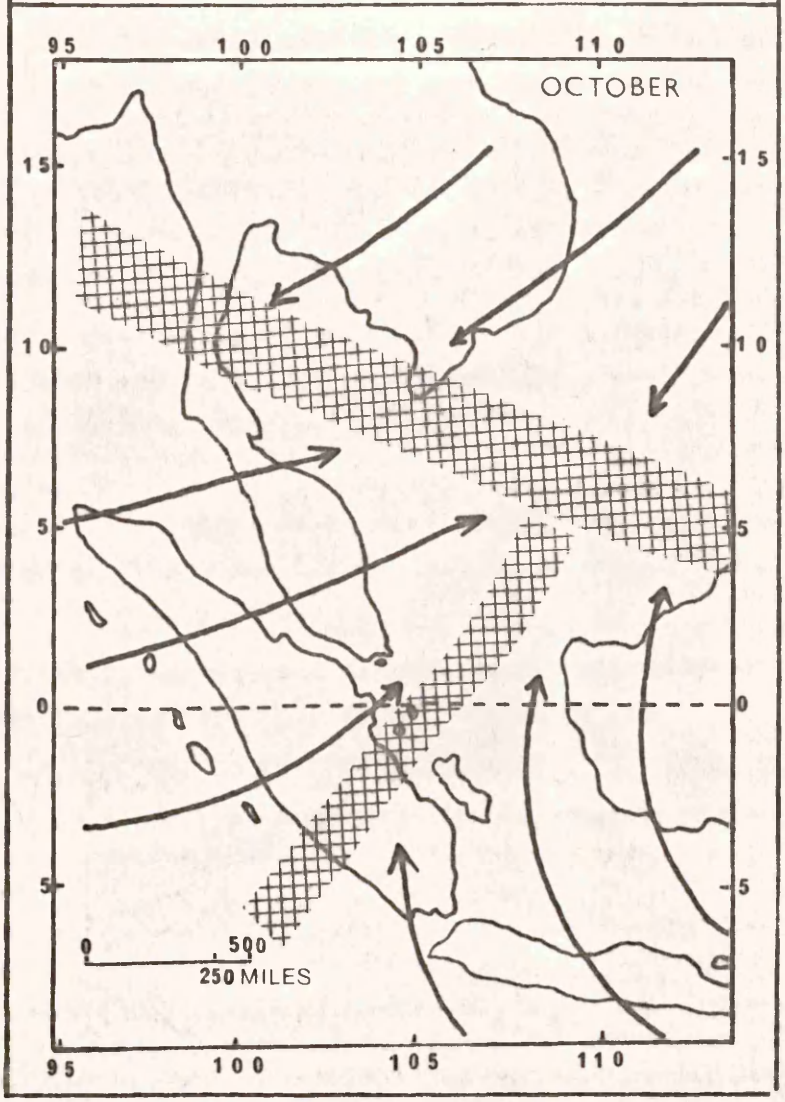


MAP 13.2.

Southeast Asian Monsoons



MAP 1.4.1.



MAP 1.4.2.

Southeast Asian Monsoons

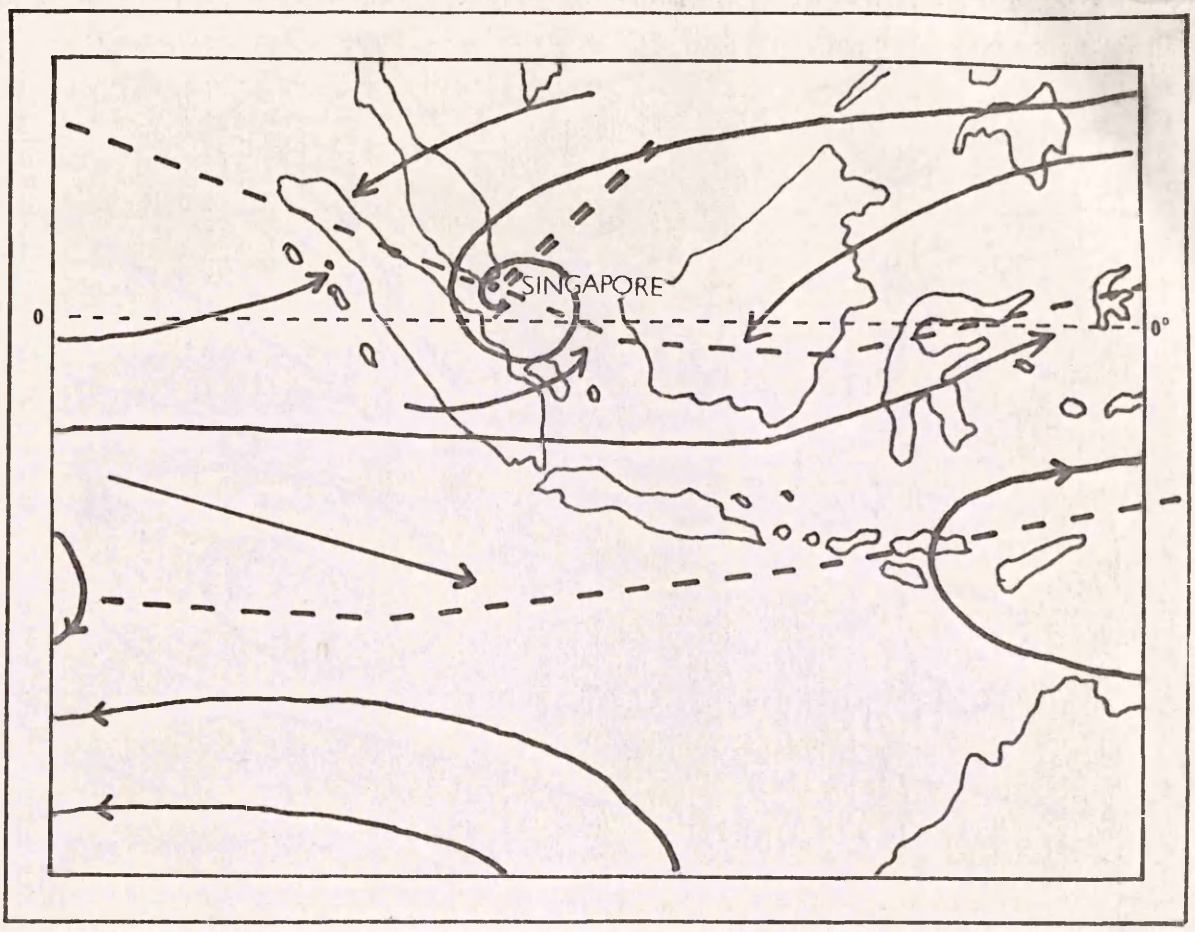
The main reason is that the slowly travelling air masses from the south have remained long enough over Sumatra to develop the conditions which lead to this type of disturbance before they reach Singapore (Nieuwolt, 1968).

The pressure to divide two periods are as follows:

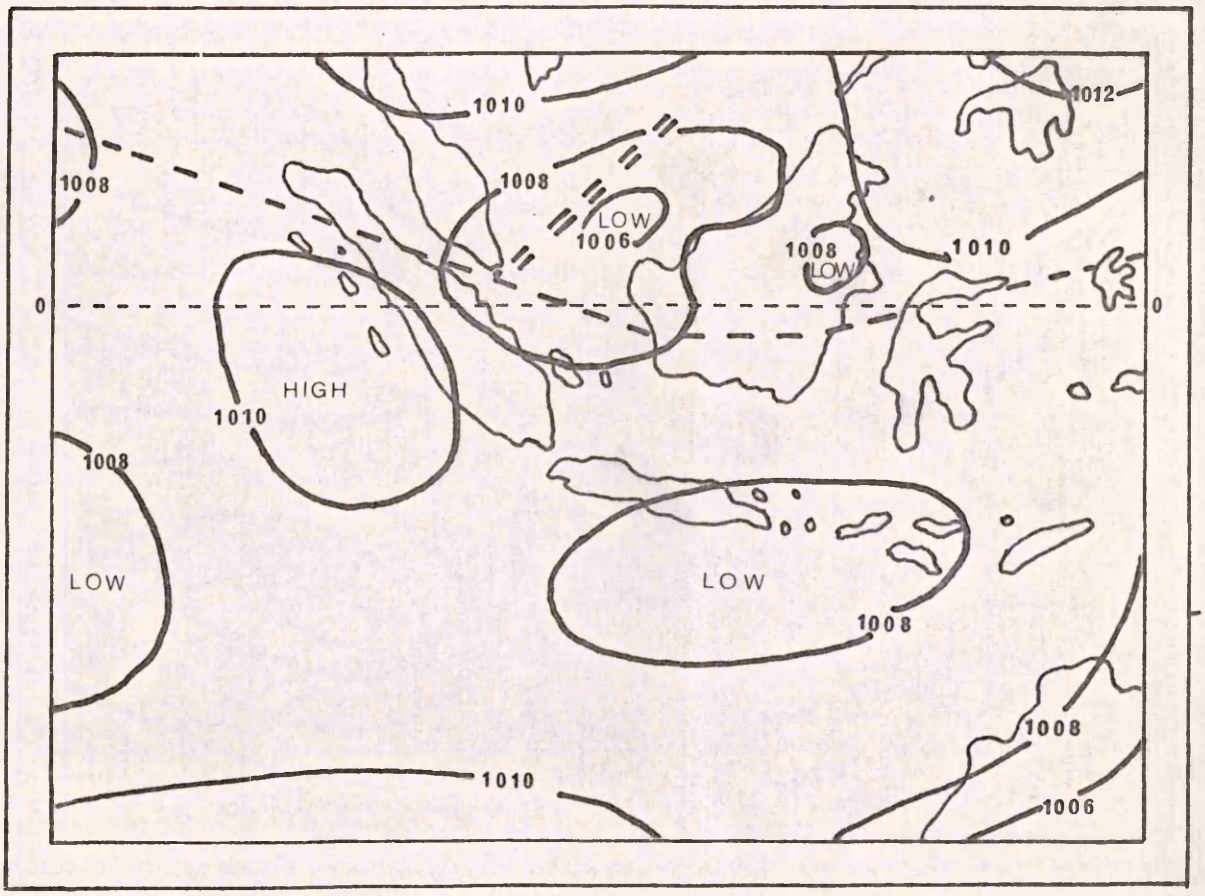
(a.) December 1954 (Map 1.5.1 & 1.5.2). The surface synoptic situation throughout the month showed that pressure was high (1025-1035 millibars) over Southern China and Japan and that there was a series of depressions (1006-1007 millibars) over the South China Sea centred about 250 miles east north-east of Changi. Throughout the remainder of the month there was either a shear line or convergence zone (obtained from the 1,000 and 3,000 foot streamline analysis) within 50 miles of Singapore and minor fluctuations in these features gave nearly the normal rainfall for the remainder of the month. The mean pressure for December 1954 at Changi was 0.5-1.0 millibars below the nine year mean for Changi at all hours, but this is within the standard deviation of 1.6 millibars.

(b) January 1957 (Map 1.6.1 & 1.6.2). During the period 19-28 January 1957 there was no shear line or convergence zone (obtained from the 1,000 and 3,000 foot streamline analysis) within 90 miles of Singapore island on any of the days. The pressure distribution over Malaya and the South China Sea was flat with a tendency towards slight ridging from the north. The mean pressure for January 1957 at Changi was within 0.1 millibars of the nine year Changi mean at all hours. In January 1957, with full wind information available, it was apparent that the 10-15 knot north-easterly flow at 1,000 and 3,000 feet was sweeping straight across Singapore island and that low-level convergence was taking place about 100-150 miles south of Singapore island (Bryank, 1958).

The climate of Singapore is an equatorial one because the monthly average of rainfall and temperature do not show dramatic seasonal variations. The chief feature of the climate of Singapore is its uniform temperature (Table 1.2). The climate is a humid tropical one with temperatures ranging from 70°F to 90°F in the shade. The temperature varies little, between an average maximum of 87°F during the day and an average minimum of 75°F at night. Dry temperature is high but never



MAP 1.5.1.: 3000 Foot Streamlines For 1200 G.M.T., 9 DEC.1954

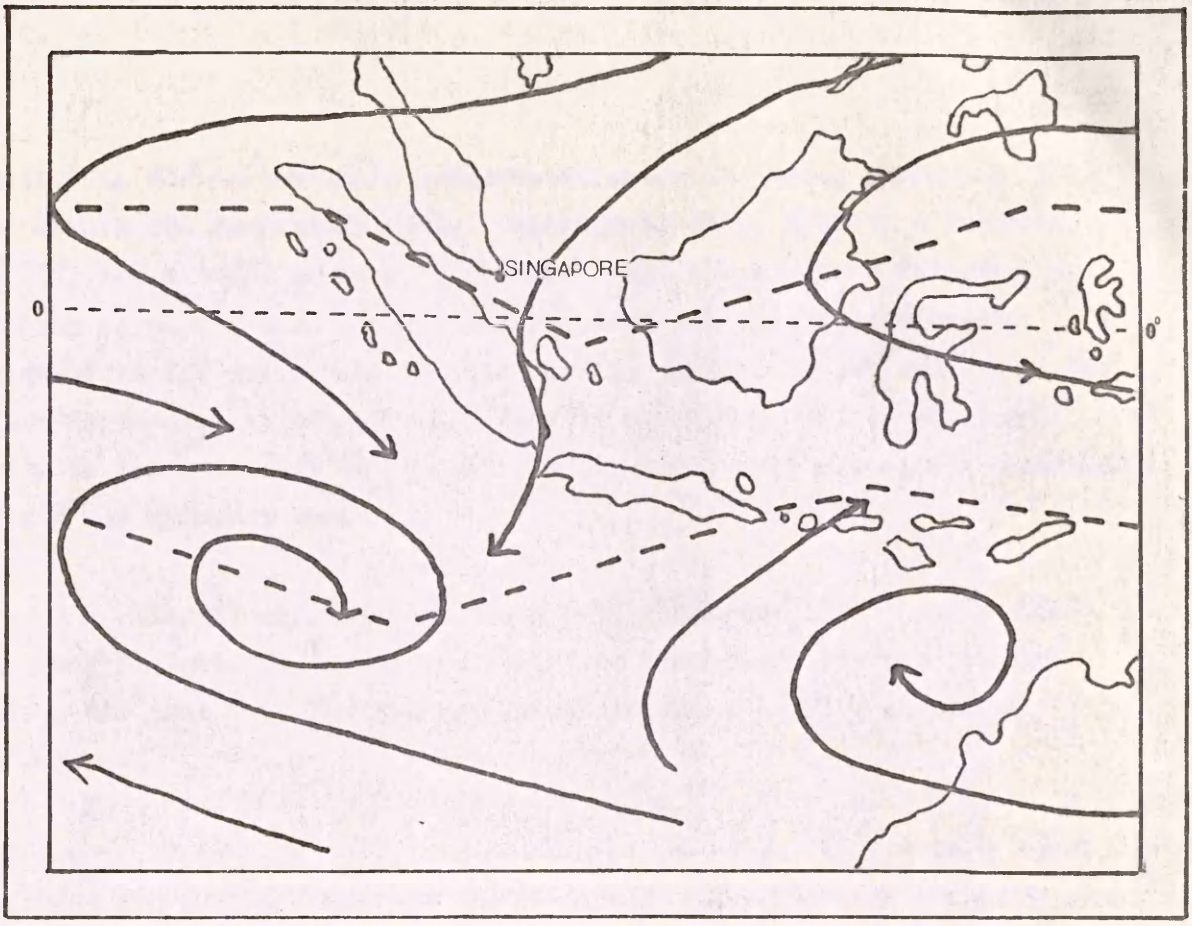


MAP 1.5.2: Mean Sea Level Pressure For 1200 G.M.T., 9 DEC. 1954

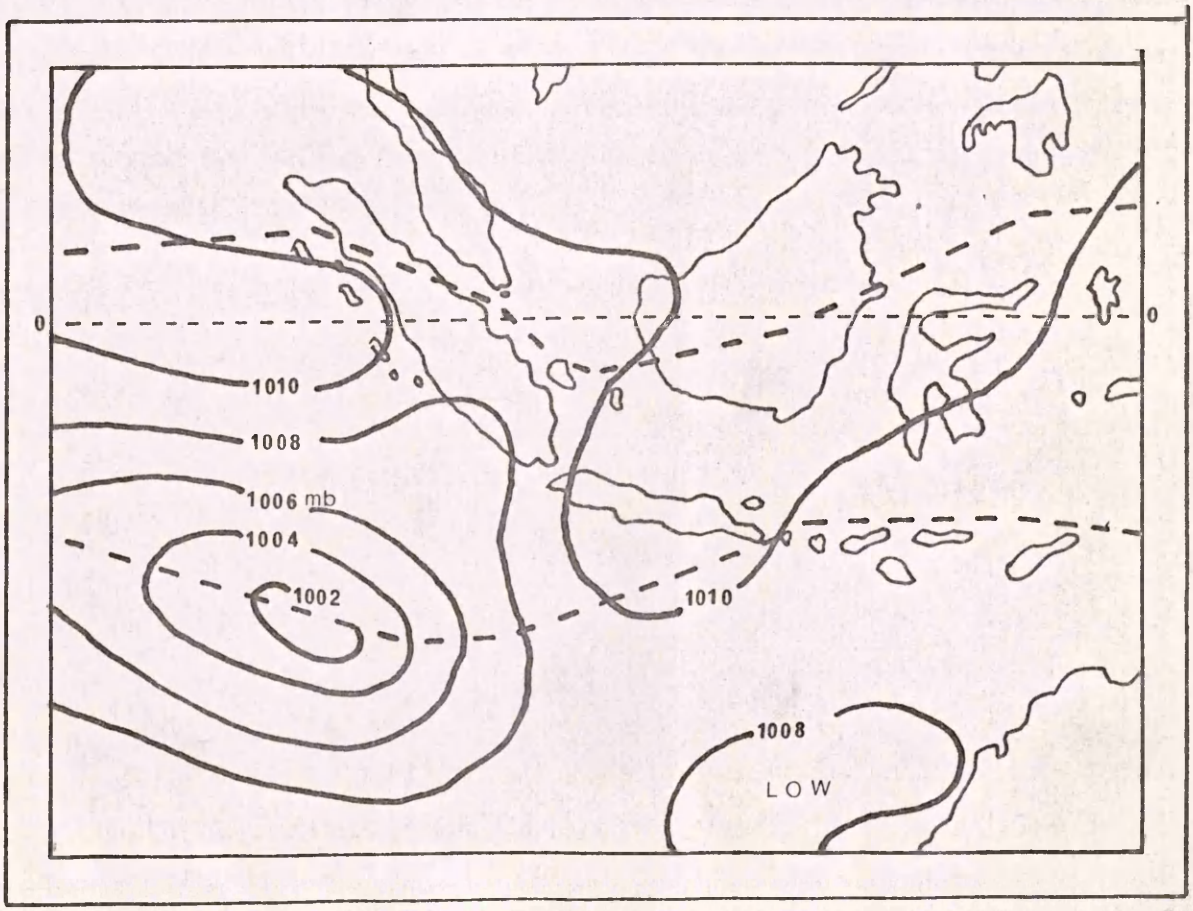
Copy From: The Meteorotogical Magazine, Vol.87 1958 P.307

Northern and Southern Limit of the Equatorial Westerlies

Shear Line



MAP 1.6.1.: 3000 Foot Streamlnes For 0001 G.M.T., 27 JAN., 1957



MAP 1.6.2.: Mean Sea Level Pressure For 0001 G.M.T., 27 JAN., 1957

excessive, and as the daily temperature range is large, averaging 12°F, the nights are reasonably cool. Singapore, which lies at a latitude of 1°29'N, has a truly equatorial climate; and the relative humidity is highest at night, when 95 per cent relative humidity is frequently exceeded in the early hours of the morning shortly before sunrise. On dry afternoons, the relative humidity is usually around 70 per cent. Owing to its proximity to the sea the nights in most places are invariably breezy and somewhat cool.

The rainfall of Singapore has a fairly uniform climate with small seasonal variations. Copious rain falls throughout the year on the island and islets. The average annual rainfall is 95.2 inches at Singapore:

J	F	M	A	M	J	J	A	S	O	N	D	Year
9.9	6.9	7.6	7.4	6.9	6.8	6.7	7.6	7.0	8.2	10.0	10.2	95.2

February and July are usually the least rainy months, with slightly more than 6.5 inches each; November and December are usually the rainiest, often having more than 10.0 inches per month. There is no well-defined wet or dry season as rain falls all the year round, but during the first half of the year, when the northest monsoon (from November to January) is moving toward the island from the Straits of Malacca, there is the most reliable rainfall (Watts, 1955).

Table 1.2

Temperature and Rainfall of Singapore, 1961-1971

Year	Mean Temperature		Mean	Rainfall		
	Maximum (F^{o})	Minimum (F^{o})	Relative humidity at 1.30 p.m. (%)	Total (ins.)	Maximum in a day (ins.)	Number of rainy days
1961	88.0	74.5	68	71.32	4.68	155
1962	87.3	74.2	71	90.05	4.32	177
1963	87.9	74.2	71	71.61	4.35	142
1964	87.2	74.0	73	111.25	5.75	212
1965	87.8	73.6	69	72.94	5.65	156
1966	87.7	74.7	70	97.65	2.37	190
1967	87.0	74.3	71	114.58	6.40	178
1968	87.3	74.3	70	81.78	4.92	176
1969	87.4	74.8	74	90.13	12.40	185
1970	87.2	74.4	74	89.65	3.32	192
1971	87.0	73.7	72	63.31	3.41	170

Source: Department of Statistics (1972), Yearbook of Statistics, Singapore, 1971/1972

CHAPTER 2

THE POPULATION GROWTH AND DISTRIBUTION OF SINGAPORE

(i) The Population Growth of Singapore

The 150 years history of Singapore is a short period for population growth but it is possible to divide it into four periods.

(a) The First Period (1819-1921). When Sir Stamford Raffles first arrived on the island in 1819 the population was less than 200. By 1821 there were 5,874 people living in Singapore; Braddell estimated that the Chinese numbered 1,150 and the Malays 4,724 in 1821 (Braddell, 1861). The first population census was taken in 1824, when the population was 10,683 (Table 2.1). During the period the population was mainly of a migratory nature as Singapore continued essentially to be a trading centre. The growth of the population was largely due to the constant flow of immigrants, principally from China and India and neighbouring countries. When contagious diseases and curative medical measures were not under the effective control, the crude death rate stood at a very high level and the crude birth rate was relatively low (Saw, 1970). The population during this period consisted mainly of a large sustained influx of immigrants (Table 2.2).

(b) The Second Period (1921-1941). The population in 1921 represented an increase of 37.5 per cent over that in 1911; the population in 1931 an increase of 33.3 per cent over that in 1921; and the population in 1947 an increase of 68 per cent over that in 1931. Between the 1937 and 1947 the population increased at an average annual rate of 4.3 per cent (You, 1954). Before 1930 the growth of the population of the area had been maintained by immigration, births being barely sufficient to balance deaths for most of the years. By the 1930's, much larger numbers of Chinese women had entered the country and natural increase had become the main factor of population growth. The increase in population arose largely from a surplus in migration, especially of females, and this helped to adjust the imbalance of the sex ratio and established the

Table 2.1

Table 2.1. ~~Urban~~ Population Growth, 1824-1970

Period	Population (1,000 persons)	Annual increase Jan-Dec. (1,000 persons)	Annual growth rate percentage	Density per sq.mile
1824	10.683	-	-	-
1947	938.100	-	3.3	-
1957	1,445.900	-	4.5	6,441
1960	1,634.000	53.0	3.4	7,277
1961	1,687.000	45.8	2.8	7,514
1962	1,732.800	42.2	2.5	7,717
1963	1,775.000	45.0	2.5	7,906
1964	1,820.000	44.9	2.5	8,105
1965	1,864.900	48.6	2.5	8,305
1966	1,913.500	42.1	2.6	8,522
1967	1,955.600	32.0	1.8	8,709
1968	1,987.600	29.2	1.5	8,853
1969	2,016.800	32.0	1.5	9,195
1970	2,074.500	35.9	1.7	9.355

Sources: Department of Statistics: Monthly Digest of Statistics Vol. 7 No. 12 Dec. 1969
Yearbook of Statistics, Singapore, 1968
Ministry of Culture, Yearbook, 1972

potential for the postwar higher rates of natural growth. The economic depression of the 1930's marked the beginning of a new phase in the growth of Singapore's population.

This period was characterized by an excess of births over deaths, but immigration was still the dominant factor of population growth and predominated over natural increase. The figures highlight a steady rise in the birth rates without any major interruption from about 29.5 to 45.9 per thousand population during the span of about twenty years from 1921 to 1940. This period from 1921-1940 had crude death rates between the levels of 29.1 and 21.5 per thousand population. The main features were a steady decline in the crude death rate as the tropical diseases like Malaria were brought under effective control and a steady rise in the crude birth rate caused primarily by the normalizing of the sex ratio (Table 2.2).

(c) The Third Period (1941-1957). Before the Second World War, Singapore was similar to West Malaysia in that a part of the population increase was attributable to immigration from China and India. After the Second World War, however, the average annual rate of population growth was 3.3 per cent to 4.5 per cent during 1947-1957; 3.7 per cent was due to natural increase and 0.8 per cent to migratory surplus. Immigration controls have reduced the latter figure but the natural increase rate remains high (Table 2.1). There are two reasons. First, during the Japanese occupation of 1942-1945 there was no immigration from China and the Indian sub-continent, and after the war immigration from all overseas countries was under strict control. Secondly, throughout the postwar years there was a rapid decline in the crude death rate and also the maintenance of the crude birth rate at a high level which resulted in the high rate of natural increase. As for the low birth rate (recorded at about 36.5 per thousand during the Japanese occupation period 1941-1945) the explanation lies in the postponement of marriges or birth due to the extremely unfavourable conditions then prevailing (Saw, 1970). During this period killer diseases were completely out of control. Crude death rates were 35.6 per thousand population, death from Dysentery and Malaria being of particular importance (Table 2.2).

Table 2.2

Crude Birth Rates and Crude Death Rates, 1901-1970

Period	Crude birth rates (per 1,000 persons)	Crude death rates (per 1,000 persons)
1901-05	21.2	47.1
1906-10	22.3	43.2
1911-15	23.9	37.6
1916-20	26.5	35.2
1921-25	29.5	29.1
1926-30	34.5	29.0
1931-35	40.5	23.1
1936-40	45.9	21.5
1941-45	36.5	35.6
1946-50	44.8	13.0
1951-55	47.8	9.6
1955-60	41.0	6.9
1961	35.5	5.9
1962	34.0	5.9
1963	33.5	5.7
1964	32.0	5.7
1965	29.9	5.5
1966	28.6	5.5
1967	25.9	5.4
1968	23.7	5.5
1969	22.2	5.1
1970	22.1	5.2

Sources: Department of Statistics, Monthly Digest of Statistics, Singapore, December, 1969

Saw Swee-Hock (1970), Singapore in Transition, p.71 & 88

Ministry of Culture, Yearbook, 1972

There are a few striking exceptions: deaths from cancer increased from 347 in 1948 to 8555 in 1958, and the rate expressed in terms of per 100,000 population has doubled over the period increasing from 36.12 to 56.67; another increase may be observed in the rate for disease of the heart which rose from 433 to 677 and the rate from 45.07 to 44.72 in 1948-1958; the third increase was in motor vehicle accidents, which registered a small rise from 99 to 183, and the rate from 10.30 to 12.09 in 1948-1958 (Table 2.3).

(d) The Fourth Period (after 1957). The corresponding figures, based on the last population census for 1957, give a population of 1,445,929 persons, more than 912,000 out of the island's total population of 1,445,929 living in Singapore city. In 1959 the total population was estimated at 1,582,000 thus putting the rate of population increase at one of the highest in the world. During the period 1964-1969, the population increased ~~increased~~ by 196,800 persons from 1,820,000 at the end of June 1964 to 2,016,800 at the end of June 1969. The average annual rate of increase during this five-year period was about 1.5 per cent (Asia Development Bank, 1970). The population of Singapore is now around 1.8 million and represents a density of 8,305 per square mile in 1965. Since 1966, however, due to a steep fall in the birth rate as well as a deficit in net migration, the rate of increase has declined. The latest estimate puts the population in 1966 at 1,913,514 and the annual rate of increase at 2.6 per cent. The population at June 1967 was estimated at 1,955,600 and the annual rate of increase at 1.8 per cent. The total population as at December, 1968 was 1,987,600 and Singapore's population as at December, 1969 was estimated at 2,016,800. This represented a further increase of 29,700 persons or a 1.5 per cent annual rate of growth (Table 2.1). The very high birth rate of the immediate post-war years had created a very high proportion of young people (66 per cent under the age of 29). As at mid-1970 the total population was estimated to be 2,074,500. Of this 74.4 per cent were Chinese, 14.5 per cent were Malays, 7.9 per cent were Indians and Pakistanis, while 3.2 per cent consisted of persons of other races (Table 2.4).

Table 2.3

Principal Causes of Death, 1948, 1958 and 1963

Causes	Number			Rate (Number of Deaths per 100,000 Population)		
	1948	1958	1963	1948	1958	1963
Cancer (B18 & B19)	347	855	1,359	36.12	56.67	76.55
Diseases of the heart	433	677	951	45.07	44.72	53.57
Motor vehicle accidents	99	183	201	10.30	12.09	11.32
Malaria (B16)	163	6	4	16.96	0.40	0.23

Source: Saw Swee-Hock (1970), Singapore in Transition, p.99

Table 2.4

Percentage Distribution of Population by Ethnic Groups, 1967 & 1970

Ethnic Groups	Population (1,000 persons)		Percentage	
	1967	1970	1967	1970
Chinese	1,504.4	1,579.8	75	74.4
Malays *	295.8	311.4	14	14.5
Indians & Pakistanis	137.5	145.2	8	7.9
Others	39.9	38.1	3	3.2
Total	1,977.6	2,074.5	100	100.0

Source: Department of Statistics (1972), Yearbook of Statistics, Singapore, 1971/1972

* Malays includes Malays as well as the various indigenous communities of Indonesia, Sabah, Sarawah and Beunei. This group corresponds to the Malaysia category use in the 1957 census.

The natural increase of the population was dominated largely by the birth pattern, with death rates remaining fairly stagnant. In 1969, the natural increase was 34,519 compared with 40,037 and 36,259 in 1967 and 1968 respectively. The rate of natural increase for the year fell from 20.5 per thousand in 1967 and 18.2 per thousand in 1968 to 17.1 in 1969, as is shown in Table 2.5. The natural increase of the Chinese is higher than that of any other community in Singapore so that the population of the island (and even more so of the city) is still becoming increasingly Chinese/ (Hodder, 1953).

The crude birth rate (per 1,000 persons) in 1956 to 1960 was 41.0 whereas the crude deaths rate was 6.9. The high birth rate is a familiar symptom in other large Asian cities, while the low death rate can be attributed to a number of factors: the high standards of public health; a low infant mortality; and a youthful age structure (Ma, 1962). The crude death rate has also showed a significant decline from 5.9 per thousand in 1961 to 5.5 in 1968 and 5.1 in 1969. Although the death rate has also declined from 5.9 to 5.1, the resultant rates of natural increase of 29.6 for 1961 and 23.1 for 1966 indicate a distinct downward trend in the population growth rate from natural factors (Table 2.2 & 2.6). The infant mortality rate also fell from 43.7 per thousand birth in 1958 to 26.3 per thousand in 1965, reaching a low of 23.4 per thousand in 1968. In the 1960's the infant mortality rate levelled off to under 6 per thousand and declining mortality was no longer a significant factor contributing to population increase (Table 2.6). The number of live births registered in 1969 was 44,738 as compared with 47,241 in 1968. Since 1958, the gradual slowing down in the crude birth rates has become a recurrent feature in Singapore. From 1961, the crude birth rate began to decline from 35.5 per thousand in 1960 to 22.2 in 1969.

In the period 1957-1969, on the basis of the survey estimate, the average annual rate of population increase declined from 4.5 per cent to 1.5 per cent. The efforts of the Singapore Family Planning Association and, subsequently, of the Government of Singapore in expanding the services of Family Planning were opportune, because the population had reached a

Table 2.5

Natural Increase of Population by Ethnic Groups, 1967, 1968 and 1969

Year	Chinese	Malays	Indians & Pakistanis	Others	Total
1967		Number			
	27,948	8,309	3,011	769	40,037
		Crude rate of natural increase (per 1,000 population)			
	19.2	29.3	18.9	13.2	20.5
1968		Number			
	25,841	7,066	2,490	789	36,186
		Crude rate of natural increase (per 1,000 population)			
	17.5	24.6	15.4	13.1	18.2
1969		Number			
	25,146	6,093	2,478	802	34,519
		Crude rate of natural increase (per 1,000 population)			
	16.7	20.8	15.4	12.8	17.1

Source: Ministry of Culture, Yearbook, 1968 & 1969

Table 2.6

Infant Mortality Rate and Natural Increase, 1958-1968

Period	Infant mortality rate per 1,000 live-births	Natural increase per 1,000 population
1958	43.7	34.3
1959	36.0	33.1
1960	34.9	31.6
1961	32.3	29.6
1962	31.2	28.2
1963	28.1	27.8
1964	29.9	26.3
1965	26.3	24.4
1966	25.8	23.1
1967	24.8	20.5
1968	23.4	18.2

Source: Department of Statistics, Monthly Digest of Statistics, Singapore, December 1969

Plate 2.1: 66 per cent of Singapore's Population is Under 29 Years of Age

Plate 2.2: 77 per cent of Chinese Population is Concentrated in the Inner Core of the City

stage of social and economic development which was receptive to the practice of family planning and improved medical facilities, during the post-war year population growth declined from 13.3 per thousand in 1947 to around 6 per thousand in 1960 in the crude death rate (Table 2.2).

(ii) Density of Population and Geographical Distribution

The growth of Singapore's population has been accompanies by a gradual change in the areal pattern of distribution. Early settlement was confined to the immediate vicinity of the Singapore River in the south east of the island. The 1957 census indicated maximum gross residential densities by census district of 6,441 persons living in one square mile. The rapid growth of the population has witnessed a steady flow of residents from the overcrowded city centre into the outlying districts. At the time of the 1957 census the city of Singapore had a density of 24,264 persons per square mile and enumerated in 1957 about 912,343 persons or 63.1 per cent of the total population residing in the city alone. The next largest proportion of 280,021 persons or 14.4 per cent (density of 4,398 persons per square mile) was taken up by Serangoon. The third largest was Katong district into a proportion of 198,680 persons or 13.7 per cent and density about 4,918 persons per square mile (Table 2.7).

As for the two western districts of Jurong and Bukit Panjang, Jurong had a density of not more than 850 persons per square mile and a population, according to the 1957 census, of about 51,065 persons; its share was 3.5 per cent of the total population. The next lowest density was Bukit Panjang with 1,728 persons per square mile and a population of about 61,522 - a share of 4.3 per cent of the total population. In the Southern Islands all the inhabitant, comprising about 1 per cent of the total population live in villages of less than 5,000 people and in fact have seen a population reduction from 15,536 in 1947 to 14,298 in 1957. The Southern Island have a declining population mainly because of the limited economic resource available in these small islands. These small islands may be considered as completely rural with very few modern amenities such as electricity and piped water. Most of those who left were Chinese from

Table 2.7

Population Density and Percentage by District & Race, 1957

District	Area in sq. miles	Population (1,000 persons)	Population (per sq. mile)	Percentage by district	Percentage by Race			
					Chinese	Malays	Indians	Others
Singapore (total)	224.5	1,445.929	6,441	100.0	75.4	13.6	8.6	3.4
City	37.6	912.343	24,264	63.1	77.8	11.0	8.8	2.4
Katong	40.4	198.680	4,918	13.7	62.1	27.5	7.2	3.2
Serangoon	47.3	208.021	4,398	14.4	79.3	8.1	10.5	2.1
Bukit Panjang	35.6	61.522	1,728	4.3	76.0	12.9	9.9	1.2
Jurong	60.1	51.065	850	3.5	82.8	14.2	2.7	0.3
Southern Islands	3.5	14.298	4,085	1.0	25.4	69.1	3.9	1.6

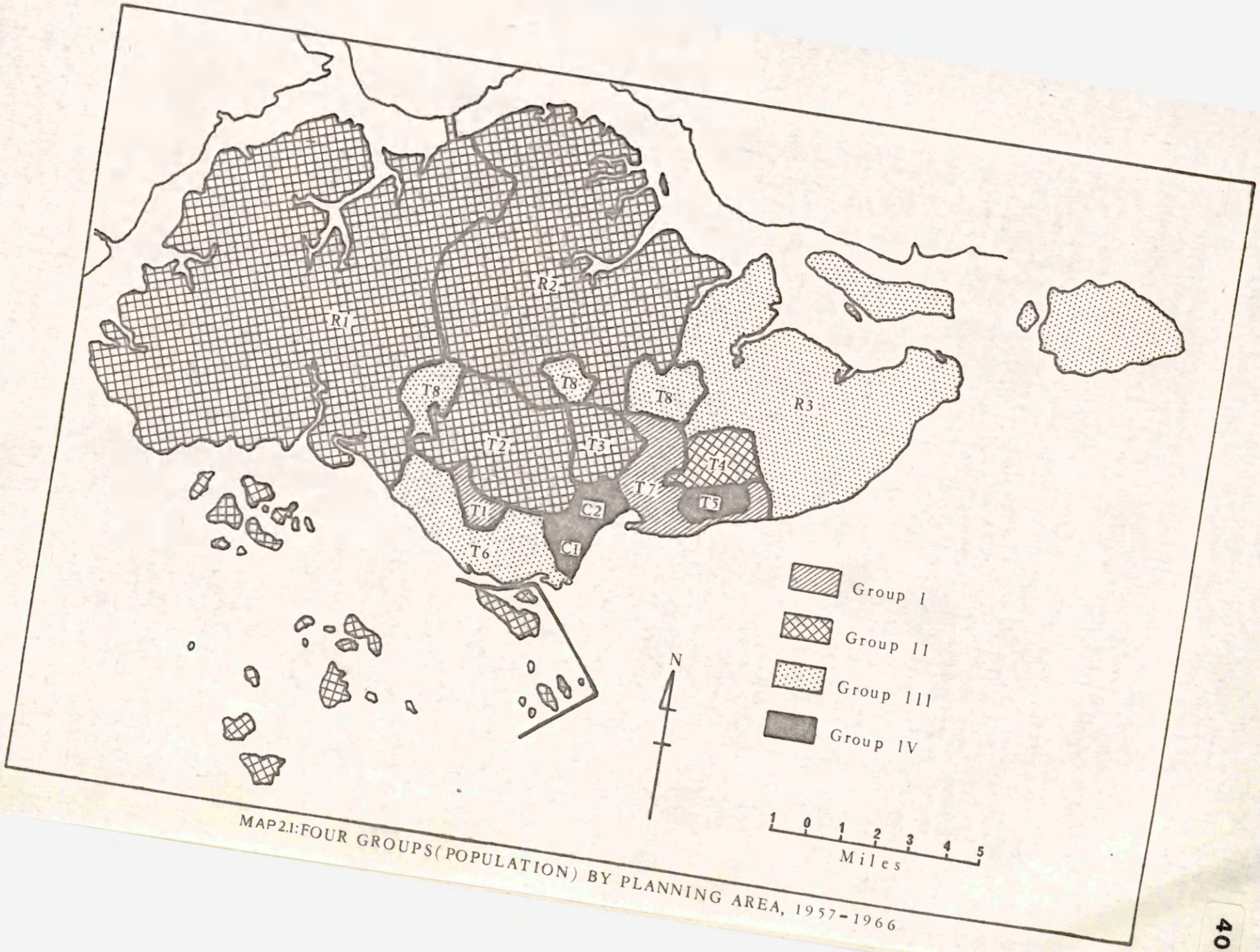
Source: Saw Swee-Hock (1970), Singapore Population in Transition, pp.31-32

Pulau Sentosa and St. John's Island (Table 2.7).

With a population if 1,820,000 in 1964 and a total land area of 224.5 square miles, Singapore has an overall population density of about 8,105 persons per square mile. A comparison of the latter figure with those of other countries shows that Singapore stands out as an extremely densely populated country. Singapore has a population of almost 1.9 million and density of 8,853 per square miles in 1968 (Table 2.1). Now there are more than two million people living in the Republic of Singapore. Three quarters of the total population, that is over a million people, live within the city area. Because of the attraction of the city the population is very unevenly distributed. The growth of the population of Singapore in recent decades (1959-1969) has resulted in soaring city densities as well as accelerated suburban expansion.

The pattern of population distribution of Singapore is determined by the location of residential population at or near places of work in the inner core of the city. The substantial area set aside for public buildings and government office sites in the city centre and with minor concentrations from Tanjong Pagar through Chinatown and Rochore to Kallang creates another pattern. Other major concentrations are in localities west of the major Chinatown nucleus in the Havelock Road and Tiong Bahru localities east of the northern nucleus in the inner Katong and Geylang areas and to the north in Serangoon (Neville, 1969). Beyond the city boundary population settlement tends to follows the lines of road transportation and there are smaller concentrations in the factory zone along the Bukit Timah Road and in the British military bases development which have lead to a greater density of settlement in rural Singapore with the principal concentrations still located along the main trunk road and in the northeast and east of the island.

The thirteen planning areas demarcated by the State and City Planning Department of Singapore on the basis of indentifiable land-use patterns can be devided into four groups (Table 2.8). The first group (Town Area 1) is the Queenstown and Alexandra Area. Its population increase in the



MAP 2.1: FOUR GROUPS (POPULATION) BY PLANNING AREA, 1957–1966

Table 2.8

Density of Population Change by Planning Area, 1957 & 1966

Planning areas	1957 Population (1,000 persons)	1957 Density (1,000 persons per sq. mile)	1966 Population (1,000 persons)	1966 Density (1,000 persons per sq. mile)	Percentage Change 1966 compared to 1957
Group 1					
Town Area 1	29.1	17.1	123.5	72.6	+324.4
Town Area 7	138.9	27.8	326.5	65.3	-135.1
Group 2					
Town Area 2	93.3	6.5	135.1	9.4	+44.8
Town Area 3	104.3	28.2	131.9	35.6	+26.5
Town Area 4	89.9	25.7	132.8	37.9	+47.7
Rural Area 1	118.2	1.4	158.9	1.9	+34.4
Rural Area 2	81.4	1.7	119.8	2.5	+46.9

/Cont.

Group 3					
Town Area 6	174.6	24.9	206.2	29.5	+18.1
Town Area 8	99.8	14.3	112.9	16.1	+13.1
Rural Area 3	114.4	2.5	124.5	2.7	+ 8.8
Group 4					
Cental Area 1	156.2	130.2	135.3	112.8	-13.4
Cental Area 2	195.0	84.8	176.9	76.9	- 9.3
Town Area 5	50.8	33.9	45.7	30.5	-10.0
Total	1,445.9	6.4	1,929.8	8.6	+33.5

Source: Economic Research Centre, University of Singapore, Singapore Sample Household Survey, 1966, Table p.2

1957-1966 period amounts to some 325 per cent; according to the census of population 1970, Queenstown's population is about 42,201 persons and Alexandra's 52,500 persons. Town area 7, shows an increase of 135 per cent and is a mixed area of slums and squatter lots, rowhoused and a number of large private housing estates, such as MacPherson Road (south), the old Kallang Airport, Tanjong Rhu-Mountbatten Road, and Aljunied Road. The 1970 Census Report put the population of MacPherson as 36,346, Kallang 28,521, Mountbatten 33,955, and Aljunied 50,434 persons. The second group includes Town Area 2 (44.8 per cent), Town Area 3 and 4 (26.5 per cent and 47.7 per cent) and the two Rural Areas 1 (34.4 per cent) and 2 (46.9 per cent). Town Area 3 has one of the largest housing and development complexes at Toa Payoh, while the population increase for this entire town area is around 26.5 per cent. The area was still under construction in 1966. In the 1970's the census of population reports about 112,785 persons living in the Board flats at Toa Payoh. When the large housing complex is completed and occupied, this area would become a high-gain area. Rural Area1 contains the large industrial complex at Jurong (1970 Census Report 49,189 persons). The emergence of the Jurong Industrial Estate (establishment 1961) has in fact transferred a sizeable population to the western side of the country.

The third group contains Town Area 6 and 8 Rural Area 3, all showing substantially lower population increase rates than the national figures. Town Area 6 also has in it a large low-cost high-rise complex at Bukit Ho Swee (1970 census of population 45,066). This area seems to have been involved in a substantial amount of internal population re-distribution and ending up as a moderate loser to the nearby Queenstown complex. The fourth group of areas comprises Central Areas 1 and 2 and Town Area 5. The two central areas contain some of the highly overcrowded slums. There has been a large-size urban renewal programme during 1966-1970. When the full effects of this programme are felt the ~~effect~~ result may be a further loss of population. Town Area 5 is situated within the site of the East Coast Reclamation Scheme (You, 1971). The Board has established large-scale housing project to attract population into the area itself (Map 2.1).

(iii) The Distribution of The Ethnic Groups

(a) Chinese. The pattern of Chinese population is concentrated in the two central nuclei in the central city area, Chinatown, Havelock Road locality and Rochore, but despite these and other smaller concentrations in the south-east of the island, as for example, parts of Jurong, Sembawang and Ulu Bedok, the Chinese population is more widely and evenly dispersed than the other ethnic groups. Hokkiens are predominant in all areas. The location of the Hokkien in the older portions of Chinatown in a zone close to the Singapore River and the coast and near the business areas, reflects the dominance of Hokkien immigrants in early Singapore and the fact most of the merchants were of this dialect group. A relatively smaller concentration of Hokkiens occurred in Serangoon, Katong and Jurong. Tiechiu are the second most numerous group; the Tiechiu area is mainly on the south bank of the Singapore river in a very compact area. The Tiechiu here are engaged in the transfer of goods between the warehouses along the river side and the numerous tongkangs, which crowed the river itself. Tiechiu are disproportionately represented is Serangoon (Hodder, 1953)

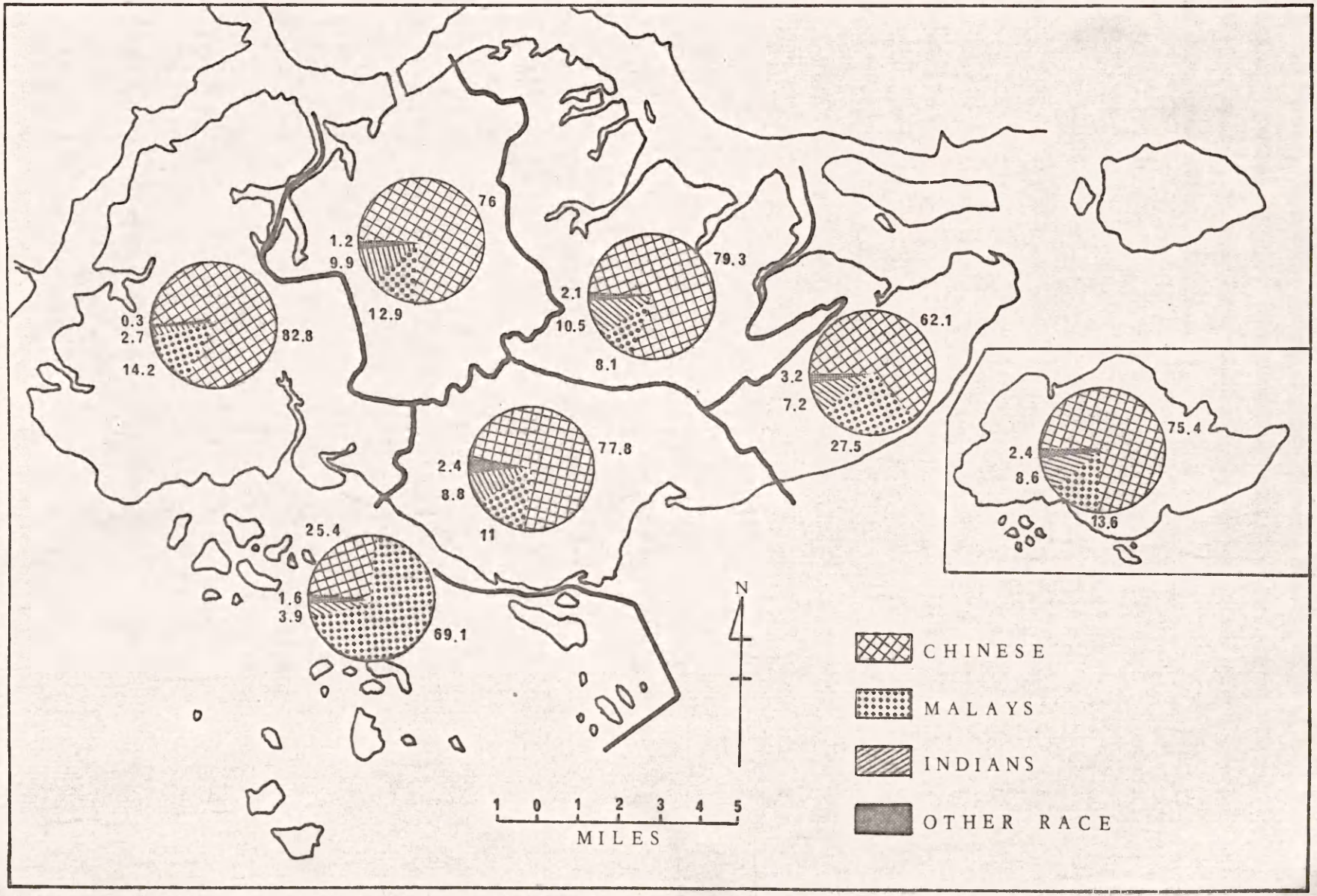
The Contonese have been artisans of all types, and have no great need of a location suitable for commercial activities; they were concentrated in a large area away from the river on the southward side. The Hainanese are also found in the developed districts; Hainanese were located mainly in the inland from Beach Road to the north of the Government area, with notable concentrations outside the central area in the Thomson Road, Bukit Timah Road, Tanglin, Upper Serangoon, Paya Lebar, Changi and Seletar, Katong and Southern Islands. Hakka (Kheh) in Jurong and Bukit Panjang; Hakka had significant proportion in all districts including the Southern Island (Neville, 1965).

(b) Malays. The distribution of the Malays population was quite different from that of the Chinese. The Malays population is almost wholly lacking in Chinatown and only minor nuclei occur in the northern section of the Rochore Area. The Malays are most heavily concentrated in the southern islands and in areas peripheral to the city, notably Pasir Panjang, Geylang Serai, Jalan Eunos and Changi. Substantial areas in the southern Jurong

and Tanglin districts also had a high proportion of Malays far in excess of their occurrence in the population as a whole (13.6 per cent). The distribution of Malays is generally similar to their proportinal representation in the group as a whole except that Boyanese outnumber Javanese in Jurong (Neville, 1969).

(c) Indians and Pakistanis. The patterns of distribution of the Indian and Pakistani population lies between the extremes of the Chinese and Malays population. The larger of the nuclei is to the north of the Rochore area in the vicinity of Farrer Park and Kandang Kerbau and in the Arab Street area further north, off Beach Road. The Indians began a ribbon development along the Serangoon Road, later to be backed by Chinese overflowing from the town centre. The other area of concentration lay south of Chinatown near the coast, with a small outlier cut off by Chinatown in and around the central business district immediately south of the Singapore River mouth. Growth of the southernmost concentration in the Tanjong Pager district had been induced by proximity to the deepwater port and the considerable involvement of India labour on the docks (Neville, 1969). Tamils exceed 60 per cent of the Indian Pakistani population of Jurong and the city but elsewhere make up a smaller but still dominant part of the total. The Malayalis contribute substantially to the population of Bukit Panjang, Serangoon and the Southern Islands, while the Punjabis are fairly evenly distributed in each administrative area. Ceylonese are numerically significant in the Farrer Park locality, Cairnhill, Katong and Whampoa, Jurong, Bukit Panjang and Serangoon (Neville, 1965).

(d) Other Races. The other races include Arabs, Bugis, ~~Ceylonese~~, Jewish, Eurasians and Europeans. The European town was placed on a fairly extensive and well-drained site adjacent to the Government area. The main areas of occupance are north of the city in Tanglin, Katong, Mount Sofia and Serangoon District. Despite small total numbers, their high degree of concentration made them a significant element. The Arab zones on the other hand, were confined between the coast and the Rochore River, Arab community was concentrated around the Muslim Istana (mosque) in Arab Street,



MAP 2.2: PER CENT DISTRIBUTION OF POPULATION BY RACIAL GROUPINGS, 1957

Baghdad Street, Bussorah Street, Jeddah Street, Muscat Street, and the vicinity (Hodder, 1953). The Jewish community concentrated around Waterloo Street, Middle Road, Sophia Road, Selegie Road, Short Street and Bancoolen Street (Map 2.2).

CHAPTER 3

THE CHANGING DEMOGRAPHIC STRUCTURE IN SINGAPORE

(i) Sex Composition. The sex composition of a population is generally studied with reference to the sex ratio defined as the number of males per 1,000 females. In the sex ratio, three phrases may be distinguished in Singapore. First, in the earlier years of 1860, the general movement of the sex ratio was towards greater disparity. This may be attributed to the declining proportion of the more settled Malay population which has a relatively balance sex ratio; and to the increase in the proportion of Chinese and Indians through an influx mainly of male immigrants from China and the Indian sub-continent. As a result the male section of the population was very much more numerous than the female section (Saw, 1964). Second, between 1871 to 1921 the sex ratio was stationary at around 3,000 and 2,000 males per thousand females. Third, after 1931, a continuous movement of the sex ratio towards parity may be observed. By the 1931 Aliens Ordinance, the growing increase proportion of immigrant women who entered the island (largely Chinese), resulted in a very abnormal sex ratio (Saw, 1970). (Table 3.1).

There followed a larger proportion of female immigrants and a growing volume of natural increase. Latterly, the flow of migration has diminished to a negligible trickle. At present the sex ratio of the comparatively settled population in the island is fairly normal with a slight excess of males over females. Subsequent progress towards a balanced sex ratio was due largely to natural increase. By 1966, the estimated average sex ratio for the total population was 1,035 males to every 1,000 females (Table 3.1). More interesting are the sex ratios of the three principal ethnic groups. Over the whole period there has been excess of males over females for all three groups (Table 3.2).

(a) Chinese. In the early nineteenth century, the Chinese population was mainly made up of immigrant single males who did not bring their women-folk with them. Being only temporary residents, these Chinese immigrants

Table 3.1

Sex Ratio of Three Phases, 1849-1971

Period	Males (1,000 persons)	Females (1,000 persons)	Sex ratio (Males per 1,000 Females)
First Phases			
1849	42.107	10.784	3,905
1860	70.122	11.612	6,039
Second Phases			
1871	72.183	22.633	3,189
1891	138.452	43.150	3,209
1901	169.243	57.599	2,938
1921	280.918	137.440	2,044
Third Phases			
1931	352.167	205.578	1,713
1957	762.760	683.169	1,117
1961	881.200	806.100	1,093
1962	903.300	829.500	1,089
1963	922.700	852.500	1,082
1964	944.900	875.100	1,080
1965	967.500	897.400	1,078
1966	991.100	922.400	1,035
1967	1,012.900	942.700	1,074
1968	1,028.000	959.900	1,071
1969	1,040.100	976.700	1,065
1970	1,062.100	1,012.400	1,049
1971	1,079.700	1,030.700	1,048

Sources: Department of Statistics, Monthly Digest of Statistics, December, 1969

Ministry of Culture, Yearbook, 1972

Table 3.2

Sex Ratios by Three Main Races, 1957-1970

(Males per 1,000 Females)

Period	Chinese	Malays	Indians
1957	1,039	1,101	2,257
1965	1,022	1,054	1,764
1966	1,009	1,020	1,459
1968	1,018	1,043	1,656
1970	1,017	1,036	1,518

Sources: Saw Swee-Hock (1970), Singapore Population in Transition, p.60

You Poh Seng, V.V. Bhanoji Rao, G. Shantakumar (1971), Population Growth and Population Characteristics, Derived from You Poh Seng & Lim Chong Yah (1971), The Singapore Economy, p.57

preferred to leave their wives and children in China. During the nineteenth century the ratio of males to females of the Chinese was the highest in Singapore, but a steady inward movement of females and a substantial emigration of males returning to their families in China tended to redress this chronic imbalance (Neville, 1963). In this context it must be noted that there is nothing abnormal about the low partial sex ratio registered for the Chinese from 1957 onwards. Apart from the possibility that relatively more Chinese females have come into the Republic during 1957-1970. In 1957 the ratio was 1,039 and by 1970 it fell further to the level of 1,017 males per thousand females (Saw, 1970).

(b) Indians. Like the Chinese, the Indian ratios have been extremely abnormal and have tended to move towards normality rather rapidly. Even up to 1957 the Indian and Pakistani sex ratios showed persistent abnormality. The sex ratio for the Indians and Pakistanis was 1,764 males per thousand females. The practice among the Indian community has been for the men of working age to migrate into Singapore in search of employment and trade, leaving behind their wives and children in India. Until very recently this practice persisted because the Indians have a lesser tendency to settle permanently (Saw, 1970). And finally, the Indians and Pakistanis, despite a relatively high birth rate and a young population of married males, have a disproportionately high male predominance in their sex-ratio.

(c) Malays. The Malay sex ratio was normal even in the early years compared with the other ethnic groups. This is because the Malay population was a more settled one even though it included some migrational elements. Although the Malays include some immigrant elements, they are in a different position from the Chinese and have not exhibited the great excess of males over females which characterised the other two communities. In 1957 to 1970, their sex ratio remained constantly normal between the range of 1,101 and 1,036 males per thousand females. Essentially, this fairly balanced sex ratio has been affected only to a limited extent by immigration (Saw, 1970).

(ii) Age Composition. Before World War II the primary effect of migration on the age-structure has been to raise the proportion within the age group of young adults, particularly males. After the war, migration no longer played a significant part in the growth of the population. Firstly, as a result, rates of natural increase tend to be high for a relatively 'young' population and there is also a small proportion of old persons. Secondly, the population structure experienced a gradual but continuous shift from a predominantly 'middle-age' structure to a relatively 'young' one as shown by the changes in the proportionate distribution among the various age groups (Neville, 1963).

As Table 3.3 indicates the population can be regrouped into broad age-groups and classified into children (age below 15), persons of working age (age 15-59) and old persons (aged 60 and above). There is change in the age structure, a rise in the first two groups and a decline in the next two working age group. The substantial increase in the proportion of population in the youngest group below age 5 is the result of the rising crude birth rate and, to a limited extent, of the relative decline in mortality at these infant years. The recent increase in youthfulness differed significantly from 1957 to 1970, for example, 18.3% in 1957, 17.5% in 1962, 14% in 1966, 11.3% in 1970 (Saw, 1970). The increase in the proportion was not so pronounced in the second age group which consists of children in the school-going age (5-14 year). That the population was progressively becoming younger is indicated by the fact that the school-group age (5-14 year) was becoming progressively larger from 24.5% in 1957, 28.1% in 1962, 29.5% in 1966 to 27.5% in 1970 (Saw, 1964). In terms of fertility, employment and migration, the third age group (15-29 year) constitutes the important and active section of the population. By 1970 nearly 590,000 (28.1%) of the population was estimated to be under fifty years of age, compared with 25.4% in 1957, 22.8% in 1962 and 25.1% in 1966. The fourth group (30-54 year) refers more to mature persons of working age. Thus the populations of 1966 and 1970 are seen to contain a relatively large proportion of adults (age 30-59) 26.1% and 27.4% respectively. The enumerated population at ages 60 and over is not very reliable on account of the tendency in the past for old people

Table 3.3

Population by Age Group, 1957-1970

Age group	1957	1962	1966	1970
Number (1,000 persons)				
0-4	264.7	302.4	270.2	235.4
5-14	354.4	486.4	569.0	569.4
15-29	366.7	395.8	483.2	582.9
30-59	404.8	473.4	504.4	568.5
60 & Over	55.3	74.7	102.9	118.3
Total	1,445.9	1,723.7	1,929.7	2,074.5
Percentage				
0-4	18.3	17.5	14.0	11.3
5-14	24.5	28.1	29.5	27.5
15-29	25.4	22.8	25.1	28.1
30-59	28.0	27.3	26.1	27.4
60 & Over	3.8	4.3	5.3	5.7
Total	100.0	100.0	100.0	100.0

Sources: Saw Swee-Hock (1970), Singapore Population in Transition, p.64

You Poh Seng & Lim Chong Yah (1971), The Singapore Economy, pp.78-80

to overstate their ages, the proportion fluctuating around 4% and 5%. The age composition for the three main ethnic groups may be studied through the age pyramids from 1957-1970. For convenience of analysis and argument, the age pyramids have been presented in four-year interval groups by sex and ethnic groups (Fig. 3.1-3.3).

(a) Chinese. In 1957 for the Chinese, the pyramid shape is completed and depicts a rapidly expanding population. The increase in the proportion aged less than 15 was rapid up to 1957, and began to decline in the post-1957 period. This is due to the recent declining birth rates. On the basis of this comparison it is obvious that the Chinese community, with its very large numbers, strongly influenced the overall pattern but had a relatively large proportion of the 5-19 age groups. The Chinese population was thus rapidly approaching a stage of normal balance between the sexes and a pattern of age groups characteristic of a settled population expanding rapidly by natural increase. At the time (1957), Chinese sex ratios showed the most imbalance in the age-group 40 to 60. By 1966, the Chinese no longer showed any evidence of their immigrant background in the ratios at older ages. By 1970, the base registers a decrease. This is due to the decline in the birth rate, which is rather rapid for the Chinese as a whole. If further decreases are registered, the pyramid will show a bell-shaped pattern in the future years (You, Rao & Shantakumar, 1971). It is apparent that the Chinese age pyramid is by comparison the most normal, with no longer the characteristic middle-age bulge which existed a decade or so ago. The only trace of the influence of prewar migration may be noticed at the two male age groups between 45 and 54 (Saw, 1970).

(b) Malays. The proportion of children under five years of age (21.9 per cent of the Malay population 1957) was the highest of any ethnic group and hides the fact that the migrant male age groups (notably those twenty to twenty-nine years of age) were numerically much larger in 1957 than they had been in 1947 (Neville 1963). The only age-group not in tune with the 'step-building' of the pyramid in 1957 is age-group 10-20. Looking at this from a different angle, we may say that inward migration in the age-group 20-30 and above has had the depressing effect on the

population in the group 10-20. Malays (including Indonesians) have the highest birth rate (but also the highest maternal mortality rate) of all four main groupings as well as the highest proportion of people under twenty years of age. By 1966, the pyramid assumes its normal character and there seems to be a slight depressing effect at the base in 1970, due to the birth-rate declining. The Malays in 1970 show a pattern similar to the Chinese in 1957, and if birth control measures are equally effective among them, they should characterize the 1970 distribution of the Chinese in the year to come (You, Rao & Shantakumar, 1971). The Malay age pyramid is a shade less normal than the Chinese pyramid in the sense that a small bulge at ages 30 to 45 has emerged; the only plausible explanation for this new development lies in net migration from Malaya into Singapore.

(c) Indians. The age pyramid of the Indians offers interesting and significant contrasts to those of the other two ethnic groups. There is no doubt that the huge bulge at the working ages and the lop-sided nature of the pyramid between the male and the female sections are the two most distinctive features which are caused by the predominance of working-age male immigrants in the prewar days, without any substantial female immigration ~~such~~ which as subsequently happened in the case of the Chinese. Since large-scale emigration of adult males back to the Indian sub-continent appears unlikely in the future, it would take many decades for these anomalous traits to disappear completely and give way to a normal age pyramid (Saw, 1964). The Indian age-distribution is representative of a population highly affected by migratory movements. By 1947, the female population seems to have a normal pattern whereas males are far too few, at least up to age 20. This may be explained by the fact that the encouragement to female immigrants from the mid-1930's has helped in the normalization of the age composition (by 1947). There is an improvement by 1957 and 1966, when the immigration of males no longer effects the distribution. Even in 1970, the male distribution is still different from the female distribution. The base of the 1970 distribution is, however, indicative of some fertility decline (You, Rao & Shantakumar, 1971). The Indian population structure indicates a major reason for irregularities

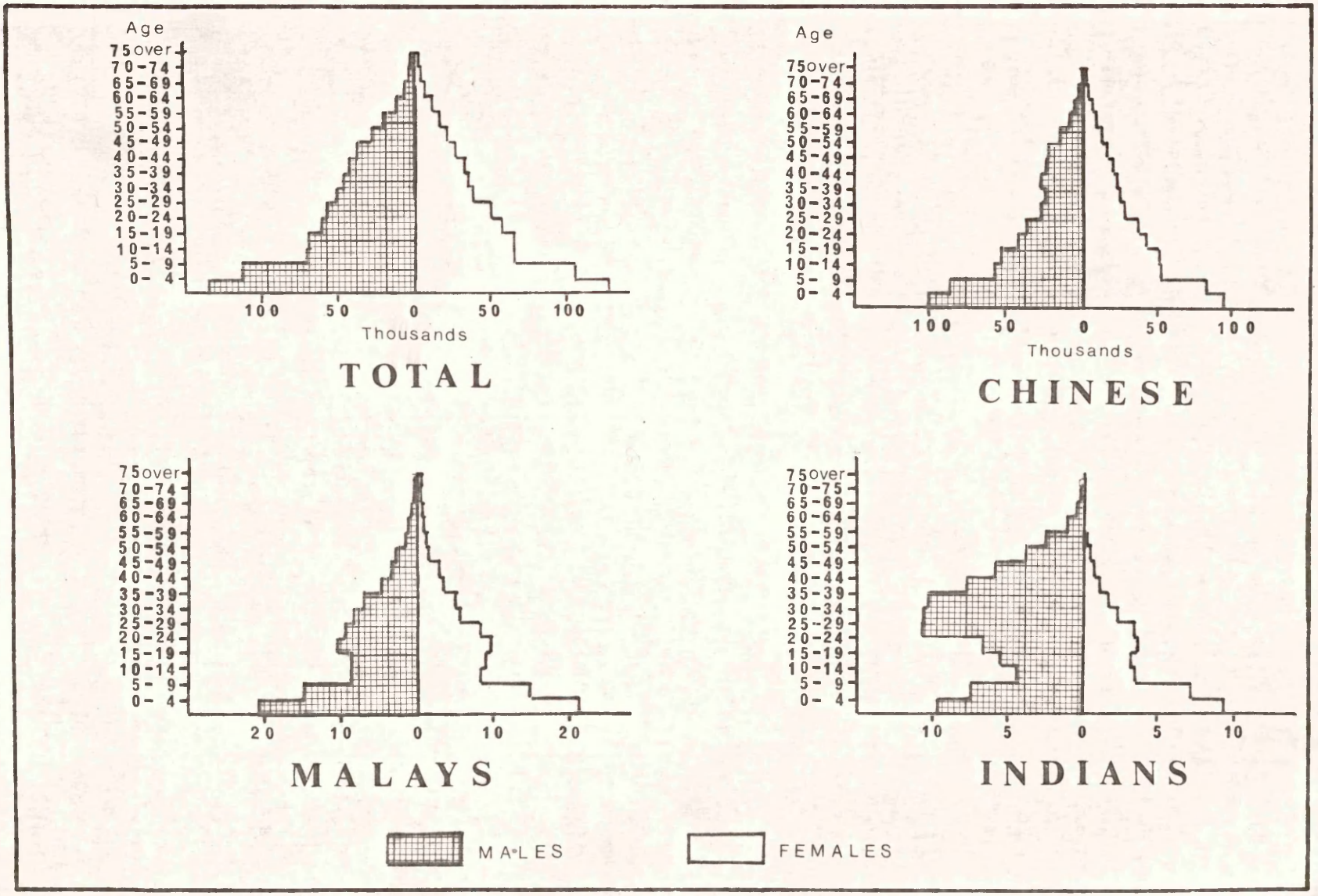
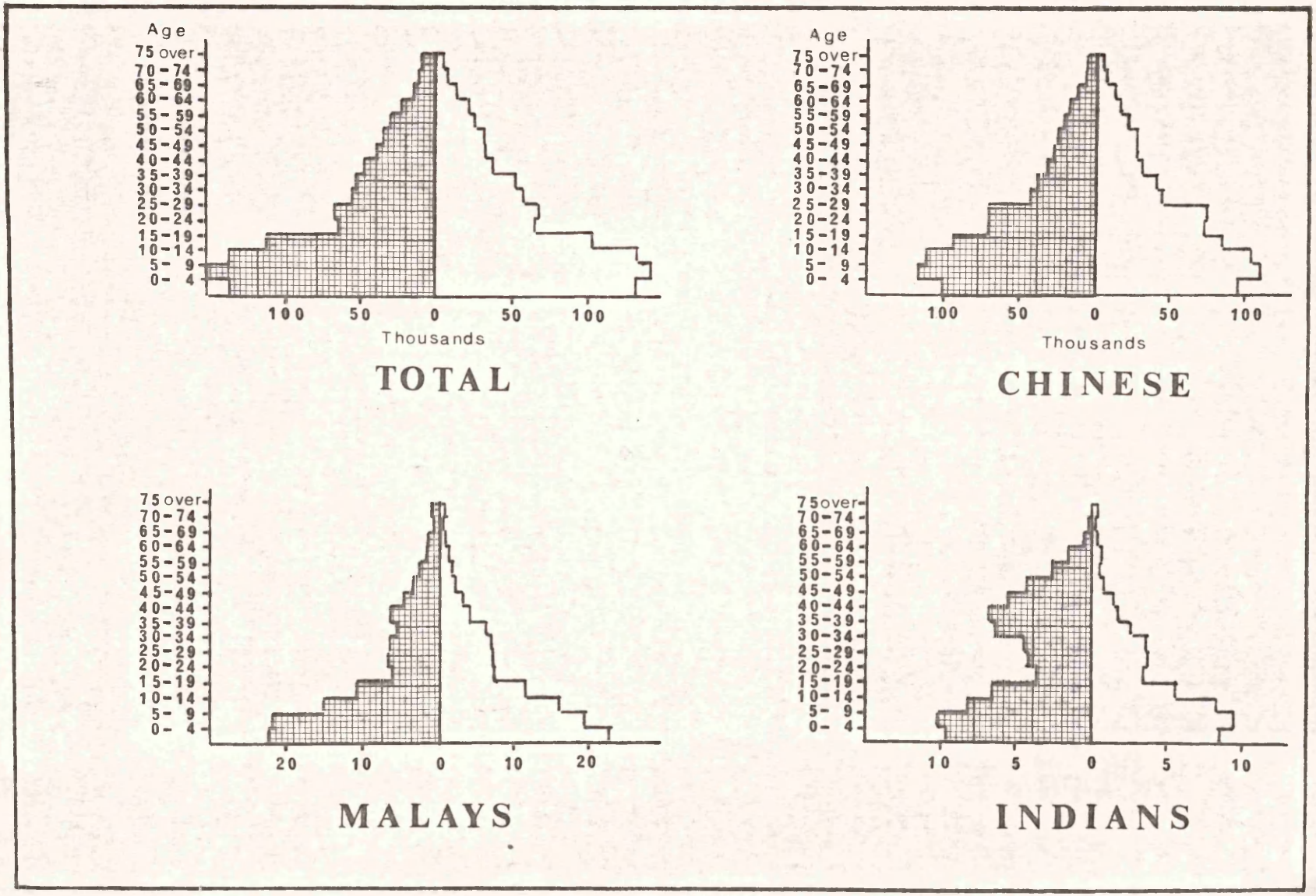


FIG. 3.1 : POPULATION BY ETHNIC GROUP, AGE & SEX, 1957


Age
75 over
70-74
65-69
60-64
55-59
50-54
45-49
40-44
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Thousands
TOTAL
Age
75 over
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45-49
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Thousands
CHINESE
75 over
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MALAYS
75over
70-74
65-69
60-64
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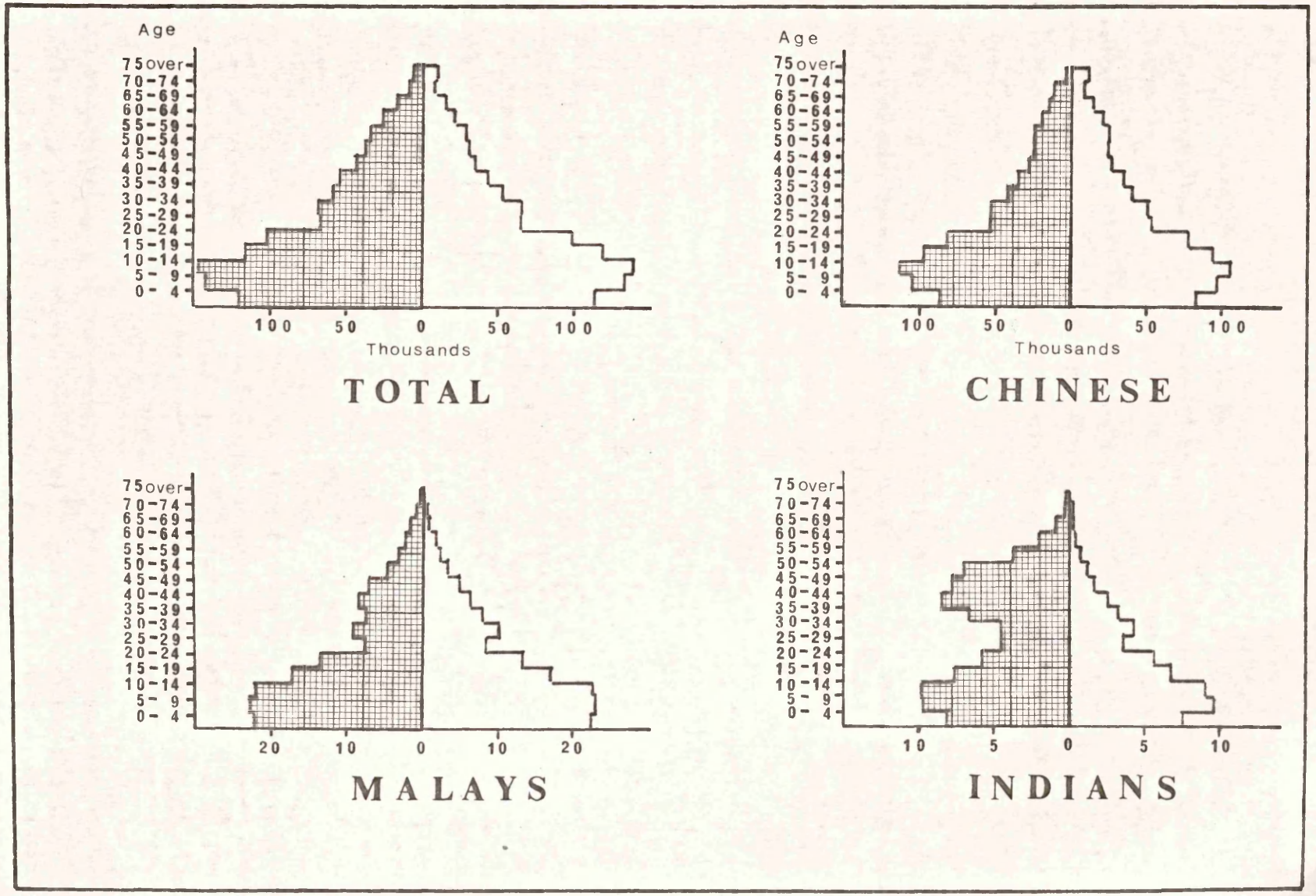
INDIANS

FIG. 3.2 : 1966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0- 4
10 5 0 5 10
INDIANS

FIG. 3.3: 1970

in the adult male pattern for the total population.

(iii) Migration problems. Problems of migration have been one of the crucial factors influencing present-day patterns in Singapore. In fact, modern Singapore owes its existence to the influx of immigrants from overseas. There were essentially three main streams of immigration into Singapore. The northern stream from China, the western stream from India, Pakistan and Ceylon, and the less important stream from Indonesia in the south.

(a) Chinese. The majority of the immigrant people in Singapore are Chinese. Chinese immigration came almost exclusively from the maritime provinces of South China (Smith, 1952). The Cantonese from central and Southern Kwantung, the Hokkien from Fukien province, the Tiechin from the north coastal portion of Kwantung around the port of Swatow, and the Hakkas from north-western Kwantung. The early nineteenth century marks the beginning of a long period of continuous Chinese migration. They came mainly to work as labourers in the tin mines, rubber estates, pepper and tapioca farms, gambier and sugar-cane plantations. As Table 3.4 indicates, during the period 1957-1961 the dominant factor in the increase of the Chinese population in Singapore was immigration ~~over~~ bigger than emigration. This may be because the majority of entry permits issued on special compassionate grounds were issued to travellers from the Chinese mainland. Because life is now extremely difficult for elderly people in China, many of them who have children in Singapore have applied to join them here.

During 1957, almost all the vessels from Hong Kong, China ports, Thailand and Indonesia carried would be illegal immigrants and stowaways. Investigations have revealed too that three methods were employed in Hong Kong for newcomers to enter Singapore or Malaya without any travel documents or permits. The first was tedious, painstaking and difficult as the would-be illegal immigrants had to cruise along the coast from Hong Kong to land in any position on the East Coast of Malaya. The second method was for those who could afford to pay a little more to buy

forged permits from Hong Kong for entry into Singapore. As these could always be detected on arrival by the immigration officers this method was never popular. The third method, being most popular of all, was to purchase sailors' tickets in Hong Kong by paying half of the cost first and by arranging with the guarantee of a shop in Hong Kong to have the remaining half paid on arrival at Singapore. These persons were the usual stowaways one found on board vessels on arrival (Lim, 1957). In addition, when Indonesia practised racial discrimination, especially against the Chinese people, the majority of Chinese illegal immigrants from the neighbouring islands of Indonesia tried to enter Singapore and Malaysia in search of a better livelihood.

(b) Malays. Although Singapore has no strictly indigenous population, the Malays, who were the first major group to settle in the Malay peninsula, are constitutionally and politically accepted as indigenous to all of Malaya, and their movement into Singapore over the last century or more is classified as internal migration. The Malay immigrants came from the neighboring islands of Indonesia. Some came from Sumatra and parts of the Riau-Lingga archipelago. Secondly, the Javanese in Singapore came from a few districts in central Java, such as Kendal Pekalongan, Madium, Ponorage and Solo. Third, the Boyanese came from the island of Barvean (near Bali). The Bugis came from Celebes (Neville, 1963). Among them were the Javanese, Bugis and Boyanese who were shrewd traders and merchants. Being persons of the same racial stock, these immigrants intermingled with the Malays and became assimilated through marriage and other contacts.

(c) Indians. Indians began their immigration into Singapore on a significant scale much later than the Chinese. The majority of migrants came from South India, for example Madras Province, Kerala, and Andhra Pradesh Province; smaller numbers came from North India such as Punjab, Sind, Bombay and Uttar Pradesh Bengal Areas.

Table 3.4 shows a deficit in Indian immigrants, all belonging to the independent type of immigrants, as inward movement was strictly controlled and as more Indians, who had been were prevented by the war from returning were

Table 3.4

Annual Chinese, Indians Immigrants and Emigrants, 1957-1962

Year	Immigrants	Emigrants	Net migrants
Chinese			
1957	101,145	95,773	3,372
1958	82,961	75,092	7,869
1959	80,889	72,768	8,121
1960	86,807	85,195	1,612
1961	89,054	88,002	152
1962	99,561	96,062	-3,499
Indians			
1957	58,743	59,294	- 551
1958	55,656	64,697	-9,041
1959	58,512	57,494	1,018
1960	56,147	64,616	-8,469
1961	59,268	66,317	-7,049
1962	59,103	65,804	-6,701

Sources: Department of Statistics (1963), Malayan Statistics Monthly Digest, 1962

Singapore: Government Printer (1962), Annual Report of the Immigration Department, 1954-1962.

emigrating back to their mother land. However, in [redacted] 1959 the factor in the increase of the Indian population in Singapore was the predominance of immigration over emigration. It mainly consisted of the Indian population who crossed the causeway from West Malaysia (Saw, 1970). From 1965 to 1969, the Indian and Pakistani population of Singapore and West Malaysia suffered a loss by migration through Singapore of about 75,000 people, over three-quarters of whom were men. Most of these were probably returning home from West Malaysia, but embarking at Singapore (Buchanan, 1972).

In the early part of 1965, Singapore and West Malaysia formed a single immigration unit. Although both territories have their own separate immigration department, movement between the two territories was unrestricted, and permission to enter one territory includes permission to enter the other. Since Singapore separated from Malaysia in August 1965, work-permits for non-citizens were introduced by the Singapore government on August 1, 1966. Both countries introduced immigration control of persons moving across their borders, thus bringing to an end the free movement of people which had existed for the past 150 years or so. Regarding the migration of persons between Singapore and Malaysia, the statistical department gives a distribution by race and age groups of 12,371 Malaysian identity card-holders who have reported a change to Singapore addresses during 1966 to 1967. Of the 12,371 persons who moved from West Malaysia to Singapore during 1966, 9,827 were Chinese, 1,243 Malays, 1,137 Indians and Pakistanis, 164 of other races. The biggest number that came to Singapore consisted of the age group of 16 to 29 years. This accounted for 8,098 persons, of whom 6,491 were Chinese, 973 Malays, 573 Indians and Pakistanis, 62 of other races.

In addition to the 12,371 Malaysian identity card holders who have changed to Singapore addresses, there were 1,182 Malaysian identity card holders who have changed to Singapore identity cards. All of them were Singapore citizen. During the same period only 1,673 persons have moved from Singapore to Malaysia. This comprised 838 Singapore identity card

holders who have changed to Malaysia identity cards-holders and have changed to Malaysian addresses. The above figures showed that there was an immigration surplus to Singapore during the period 1966-1967 (The Mirror, 1967).

CHAPTER 4

SOME ECONOMIC CHARACTERISTICS OF THE POPULATION AND FAMILY PLANNING IN SINGAPORE

The economic structure of the population of Singapore has been tabulated according to status, industry and occupation. Regarding definitions of economic activity status, this approach distinguishes basically the economically active from the economically inactive. The economically active comprise those who are working, together with those who, though having a job, are for one reason or another temporarily absent from work, and those who are not working but are looking for work. Economically inactive includes those not working and not looking for work. In addition, economically inactive persons are mostly dependents, even though they may be included in the working age groups, home houseworker, full-time students, ill or incapacitated persons and retired persons. The economic activity status of the population, based on the 1966 census, indicates that about 57.9 per cent over ten years of age was economically inactive and 42.1 per cent economically active. As for the economically active population, 38.2 per cent were working and only 3.9 per cent not working but looking for work. In the economically inactive section 27.8 per cent were home houseworkers and 25.4 per cent were full-time students. A more important feature of the table concerns the very marked differences between the sexes. About 53.2 per cent of the economically inactive females were home houseworkers as compared with a corresponding percentage of about 2.5 per cent for the males. On the other hand, the proportion of full-time students amounted to about 27.5 per cent for the boys as against 23.2 per cent for the girls (Table 4.1).

From 1957 to 19.72, development plan estimates of the increase in economically active population are shown in Table 4.2. These estimates were derived by projecting the 1957 census ratio of economically active in each age group, separately for males and females, so that no allowance is made for an increasing proportion of females seeking work, or for

Table 4.1

Percentage Distribution Aged 10 and Over by Activity Status, 1966

Economic activity status	Total	Male	Females
Economically active	42.1	64.4	19.8
Working	38.2	59.8	16.7
Not working but looking for work	3.9	4.6	3.1
Economically inactive	57.9	35.6	80.2
Home houseworker	27.8	2.5	53.2
Full-time students	25.4	27.5	27.2
Ill or incapacitated persons	2.2	2.0	2.4
Retired persons	2.5	3.6	1.4

Source: Republic of Singapore (1967), Singapore Sample Household Survey, 1966 Report No:1 Table p.54(c)

Table 4.2

Estimates of Economically Active Population for Ages of Fifteen and Over *, 1957-1972

Year	Development Plan Estimate (Table 3.6.1) Economically active	Increase	Saw Swee Hock (Table 3.6.2) Economically active	Increase
1957	471,500		480,300	
1962	523,000	51,500	539,200	58,900
1967	602,100	79,100	623,200	84,000
1972	707,500	105,400	730,700	107,500

Sources: Saw Swee Hock and Ronald Ma (1960), Economic Characteristics of the Population of Singapore, Derived from Malayan Economic Review, April 1960, Table 15

Ministry of Finance. Development Plan, 1961-1964, Singapore, Table 18

* Estimates for ages ten and over, asume constant age group and fertility rates at 1957-58 level, no migration, and that the ratio of economically active to total population for each five years age group and sex remains at the 1959 level. In the estimates involving age fifteen and over, similar assumptions are males.

increase in population due to migration. It is possible that the projections of economically active population in the plan are conservative. An alternative projection, compiled by Saw Swee-Hock of the University of Singapore, is shown in Table 4.2.2. In Table 4.2 the difference in the 1957 figures appears to be that Saw Swee-Hock's figures include children under the age of fifteen. In the absence of legislative control of child labour, about 8,700 children under fifteen were economically active in 1957 (Saw and Ma, 1960).

(i) The Industrial Sector - Occupational Distribution

In the industrial structure a division is made in terms of the broad traditional groups, namely primary, secondary and tertiary. Primary industries include agriculture, mining, fishing, hunting and forestry. Primary industries in Singapore are of only minor importance. The 1957, census in Singapore shows 7.3 per cent and in 1966 it declined to 3.8 per cent; this reflects the fact that entreport trade in Singapore is of growing importance (Saw, 1970). The secondary industries include manufacture, building and construction. The 1957 census in Singapore shows that 20.9 per cent of the labour force in Singapore was engaged in secondary manufacturing and construction industries and in 1966 increased to 25.6 per cent. This is because the construction activity has played a significant role in the modernization of living conditions of the people. The proportion employed in manufacturing has increased from 1957 (15.6 per cent) to 1966 (19.3 per cent) reflecting the industrialization programme of the period (You, Rao and Kumar, 1971).

In addition, the country has begun the transition from an entrepot-trading economy to a manufacturing entrepot service. Faced with a probable decline in entrepot trade and a rapid increase in the working age population, the government has been encouraging rapid industrialisation. This resulted in the setting up of several industrial complexes, the largest of which is the Jurong Industrial Estate. So manufacturing economy will propably cause very sizeable changes in the Republic's

Table 4.3

Industrial Composition of the Labour Force, 1957 & 1966

Industries	1957	1966
Primary industries		
Agriculture & Fishing	7.0	3.5
Mining & Quarrying	0.3	0.3
Secondary industries		
Manufacturing	15.6	19.3
Construction	5.2	6.3
Tertiary industries		
Commerce	25.8	23.7
Transport & Communication	10.7	9.7
Services *	35.4	37.2
Total	100.0	100.0

Source: Saw Swee Hock (1970), Singapore Population in Transition, p.130

Republic of Singapore (1967), Singapore Sample Household Survey, 1966, Report No:1 Table p.84 (a)

* Includes electricity, gas, water and sanitary services. The distributions have been worked out with a view to achieve as much comparability as possible.

occupational distribution. The tertiary industries include electricity, gas, water and sanitary services, commerce, transport, storage and communication and other services. In Singapore, the greater part of the labour force is engaged in the group of tertiary industries or mainly service industries. Singapore occupies a unique position in which about 70 per cent (1966) of the labour is concentrated in the tertiary sector, a reflection of the dominant role played by commerce, finance and services in the country's entrepot economy (Saw, 1970). The tertiary industries of the labour force in the year 1957 and 1966 are presented in Table 4.3. Some important points include the decline in the proportion employed in commerce 1957 (25.8 per cent) declined to 1966 (23.7 per cent). Transport and communications indicates the possible influence of improved methods of ~~improved methods of~~ conducting these activities. The well-known phenomenon of increasing proportion in the services sector during the process of economic development is observable.

(ii) Distribution of Labour Force by Main Ethnic Groups

Table 4.4 and Figure 4.1 shows the distribution of the labour force by main ethnic groups within each main industrial category. Reflecting their absolute preponderance in the labour force, Chinese dominate all main categories of employment, except for Public Utilities, in which Malays, Indians and Pakistanis together account for nearly 55 per cent of the labour force. In four industrial categories - primary industry, manufacturing, construction and commerce - Chinese account for over 85 per cent of all workers. In the two remaining categories - public utilities and services - Malays, Indians and Pakistanis are strongly represented (Buchanan, 1972).

Table 4.5 and Figure 4.2 also show that in all groups the highest proportion of employment is in the service sector (33.7 per cent) commerce (22.3 per cent); and that agriculture is only 0.3 per cent. The Chinese have the highest proportion of workers in service (29.3 per cent) and commerce (24.1 per cent). In commerce the Chinese occupational structure

Table 4.4

Percentage Distribution of Economically Active Persons Aged 10 and Over by Race for Each Industry, 1966

Industries	Chinese	Malays	Indians & Pakistanis	Others races	Total
Primary	93.6	5.5	1.9	-	100.0
Manufacturing	90.2	5.3	3.8	0.8	100.0
Construction	87.0	6.3	6.4	0.3	100.0
Elect. Gas Water & Sanitary services	42.3	21.8	32.8	3.1	100.0
Commerce	86.7	4.1	7.8	1.4	100.0
Transport storage & Communications	81.0	8.7	6.8	3.4	100.0
Services	69.9	14.5	10.2	5.4	100.0

Source: Republic of Singapore (1967), Singapore Sample Household Survey, 1966 Report No:1 Table p.84 (a)

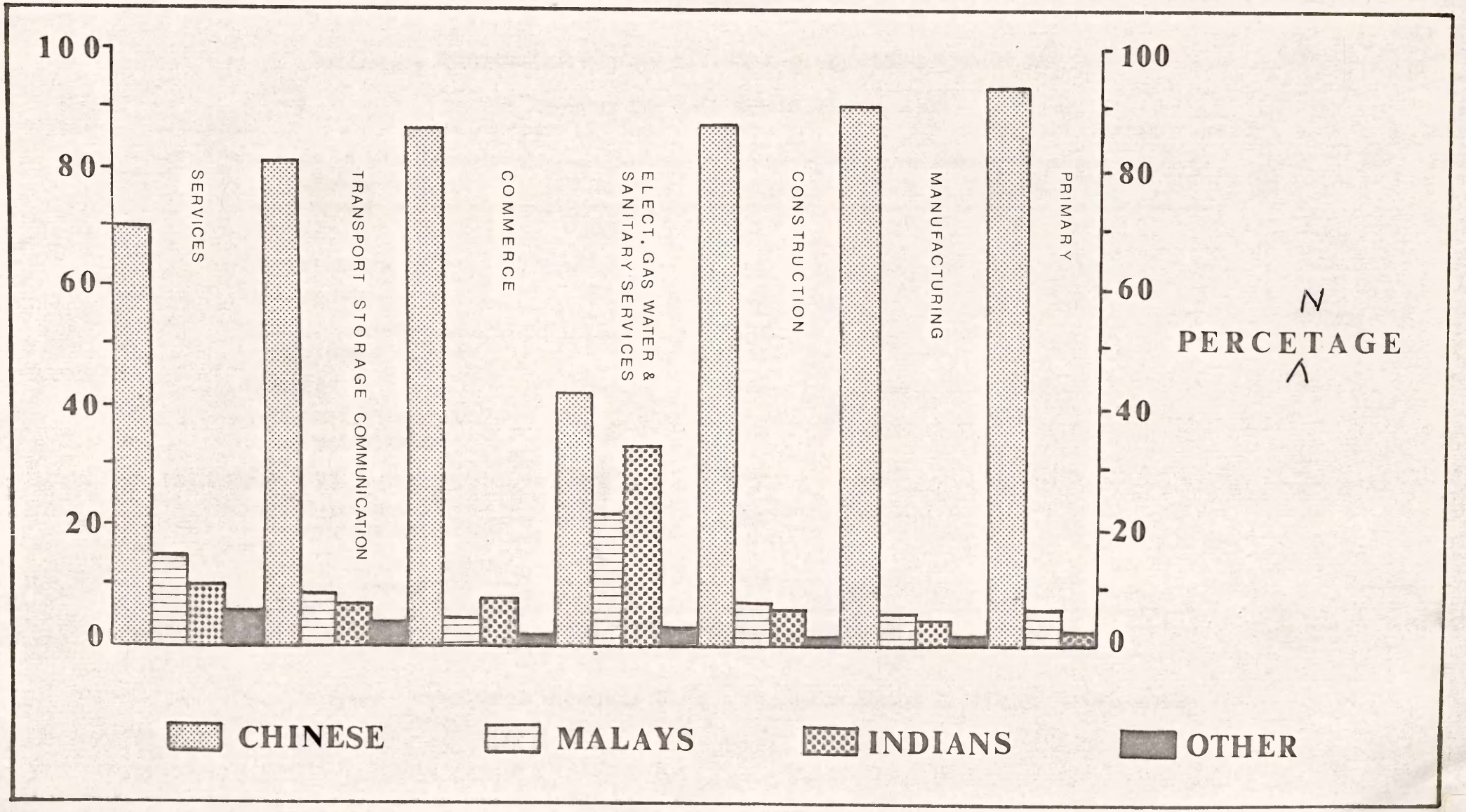


FIG. 4.1 : DISTRIBUTION OF THE ECONOMICALLY ACTIVE POPULATION WITHIN EACH INDUSTRY BY MAIN ETHNIC GROUP, 1966

Table 4.5

Percentage Distribution of Economically Active Persons Aged 10 and Over by Industry for Main Ethnic Groups, 1966

Industries	All races	Chinese	Malays	Indians & Pakistanis
Primary	3.5	4.1	2.1	0.8
Manufacturing	18.1	20.3	10.5	8.8
Construction	6.0	6.5	4.2	4.9
Elect. Gas water & Sanitary services	1.3	0.7	3.1	5.5
Commerce	22.3	24.1	10.0	22.5
Transport, Storage & communications	9.2	9.2	8.8	8.0
Services	33.7	29.3	53.6	44.3
Activities not adequately described	0.3	0.2	0.3	-
Persons who have never worked before	5.0	5.0	6.9	3.8
Total	100.0	100.0	100.0	100.0

Source: Republic of Singapore (1967), Singapore Sample Household Servey, 1966 Report No: 1 Table p.84 (b)

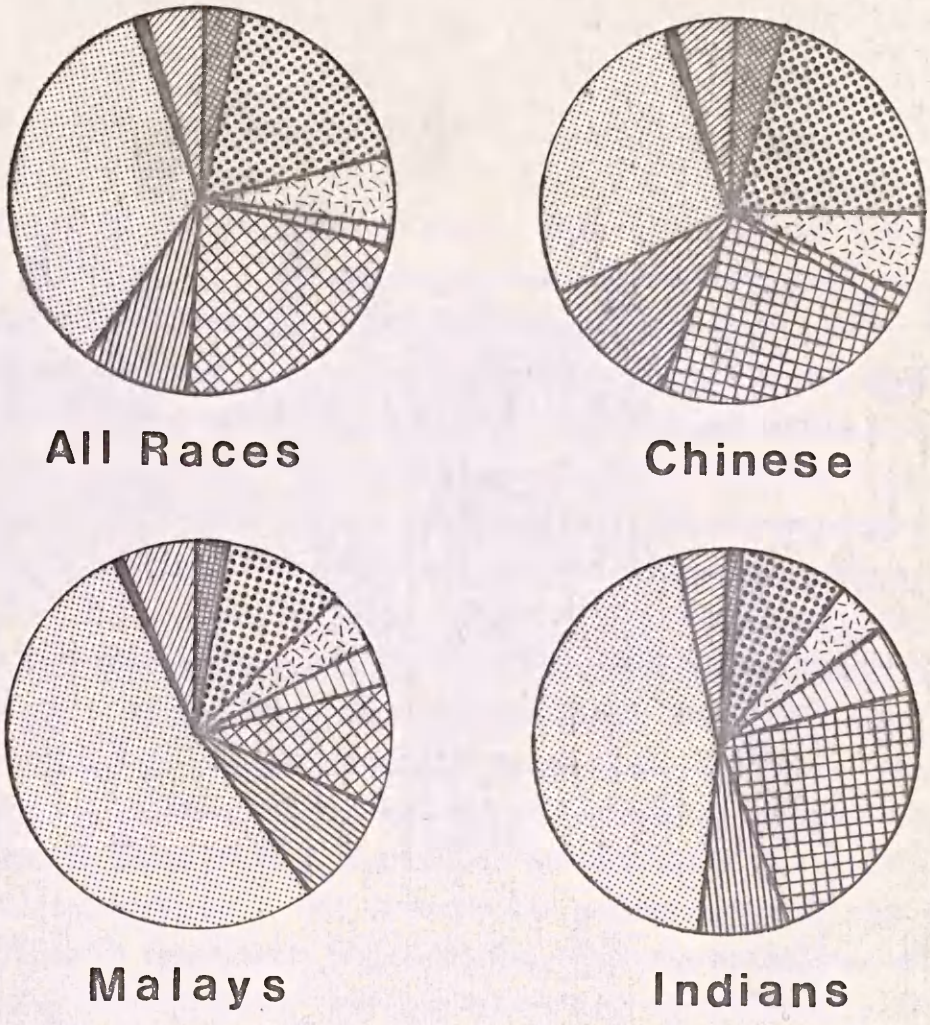


FIG. 4.2: DISTRIBUTION OF THE ECONOMICALLY ACTIVE POPULATION IN EACH MAIN ETHNIC GROUP BY INDUSTRY, 1966

Source: Buchanan, I. 1972. Singapore in Southeast Asian- An Economic and Political Appraisal, p.177.

is characterized by a large number of hawkers (Hokkiens and Tiechiu are proportionately stronger in hawking), petty traders and shop-assistants, concentration in certain types of retail trade (the selling of clocks and watches, electrical goods, furniture, bicycles, and automobile spares), pawnbroking (Hakkas prevail in the pawnbroking business), and dealing in small holders produce. Within manufacturing Cantonese are strongly represented in skilled trades and craft-industries and Hokkiens in unskilled or semi-skilled labour. Of all groups, the Malays have the highest proportion of workers in service (53.6 per cent) and in commercial (10 per cent) occupations they concentrate in clerical work, shop-assisting and hawking, but Malay retail trade is largely confined to selling specifically Malay or Moslem consumer goods and has diversified little beyond this narrow field. In manufacturing (10.5 per cent), the Malay labour force was concentrated in wage employment in large firms in 1957. One-third of all Malay manufacturing workers were in beverage industries, printing and publishing firms (with a significant concentration in British-controlled enterprises). But with the far greater range of wage employment opportunities in present-day manufacturing, this specialization has diminished. Nevertheless, very few Malays work in small-scale or craft industries and female wage-labour is uncommon.

Finally, most Indians are service workers - about 44.3 per cent. Out of the remainder, nearly 25 per cent of Indian employment is in commerce, mainly in sundry goods, stall-holding, food, textiles, and stationery retailing. As for manufacturing, the Indian labour force (8.8 per cent) does not show any marked specialization, while in the public utilities sector the most pronounced concentration is in the generation and distribution of electricity, followed by sanitary services and water supply (Buchanan, 1972).

(iii) Occupational Structure in Singapore

The pattern of occupational distribution is laid out in Table 4.6; clearly, shifts in occupational distribution are complementary to the

Table 4.6

Comparative Percentage Distribution of Occupational Structure of Singapore Labour Force in 1957 & 1966

Principal Occupations	1957	1966
Professional, Technical & Related workers	4.8 (22,689)	6.5 (37,580)
Administrative executive & Managerial workers	1.9 (8,891)	1.8 (10,337)
Craftsmen, Production-process workers & Workers not else where classified	1.3 (147,758)	27.1 (154,739)
Sales workers	18.3 (86,320)	15.1 (86,954)
Clerical workers	10.4 (49.181)	11.6 (66,948)
Agricultural, Forestry, Fishery & Related workers	7.9 (37,113)	3.4 (13,491)
Service, Sport entertainment & Recreation workers	17.1 (80,912)	20.6 (118,916)

Sources: Saw Swee Hock (1970), Singapore Population in Transition, p.132

Republic of Singapore (1967), Singapore Sample Household Survey, 1966 Report No:1 Table p.91 (b)

changes in industrial composition. For instance, there is a decline in the proportion of agricultural and related workers. Table 4.6 also shows a decline in the proportion of craftsmen, production process workers, etc. This decline is mainly due to the attempt in the 1966 survey to identify occupations in more definite terms than in the 1957 census. The decline in the proportion of sales workers is complementary to the declining relative importance of commercial activities as shown by the industrial composition. Table 4.6 reveals a good degree of increase (from 4.8 per cent to 6.5 per cent) in the proportion of professional, technical and related workers, and a moderate increase (from 10.4 per cent to 11.6 per cent) in the proportion of clerical and related workers. An increase in the tempo of manufacturing, contruction, public utility and service activities will all call for more persons from the afore-mentioned occupational groups.

The occupational structure of the economically active population showed some deviation in residential location Compared To administrative areas. Agricultural occupations (notably market gardening) predominated only in Jurong where there were few economically active people. In all other areas craftsmen, production process workers and labourers formed the most important group of workers. This was followed, in the city and in Katong by sales occupations; in Serangoon and the Southern Islands by services; and in Bukit Panjang by farming and fishing (Hassan, 1970). The variation in the distribution of occupations in each ethnic group is significant because it can be taken as an index of the distribution of social status within those groups. Table 4.7 describes the occupational distribution within each ethnic group in Singapore in 1957 and 1966.

Table 4.7 shows that the Chinese and the Indians-Pakistanis are concentrated in the occupational categories of craftsmen-production process workers and general labourers, sales and service-sport recreation. However, it is worth mentioning that within these principal occupational categories the actual jobs done by the Chinese and the Indians-Pakistanis are substantially different. Although Chinese out number Indians-Pakistanis

Table 4.7

Percentage Distribution of Economically Active Persons Aged 10 and Over Economically Active by Race for Each Principal Occupation, 1966

Principal occupations	Chinese		Malays		Indians Pakistanis		Others	
	1957	1966	1957	1966	1957	1966	1957	1966
Professional, Technical & Related workers	4.4	6.2	2.9	4.2	3.7	6.5	27.5	23.8
Administrative executive & Managerial workers	1.6	1.7	0.5	0.4	1,8	2.2	15.7	8.7
Craftsmen, Production-precess workers & Labourers	31.5	28.6	22.7	20.5	36.2	24.9	6.7	11.5
Sales workers	19.4	16.9	3.2	2.8	19.6	15.8	6.4	2.0
Clerical workers	9.4	11.2	12.1	11.3	11.9	12.3	24.1	22.0
Agricultural, Forestry fishery & Related workers	8.7	3.8	9.4	2.9	3.0	0.7	0.3	0.0
Workers in service, Sport & Recreation occupation	15.7	18.7	28.6	33.1	16.6	27.8	10.2	15.6

Sources: Singapore Government Printer (1962), 1957, Report on The Census of Population, Table 87

Republic of Singapore (1967), Singapore Sample Household Survey, 1966 Report No:1 Table p.91 (b)

in most activities, much higher proportions of Indians are equipment operators and foremen, whereas major proportions of Chinese are classified as production processing workers, as carpenters and cabinet makers and as tailors and dressmakers. Fewer Malays are craftsmen or labourers and larger numbers of Malays are employed in service and in transport and communication occupations - especially as drivers, postmen and messengers. The service category is important in all ethnic groups and the proportion of persons working in this occupational category has increased between 1957 and 1966 for all ethnic groups. Within this occupational category there is also considerable diversity. In servicing occupations, the Chinese are mainly concentrated in domestic service, hotels, hospitals, clubs and restaurants, especially as servants, cooks, waiters and also as hairdressers, launderers and dry cleaners. The Malays are mainly member of the armed forces, firemen, policemen, and workers in domestic service. Most Indian and Pakistani service workers are mainly jaga (watchmen) and policemen, but are also cooks, waiters and hairdressers.

(iv) Family Planning in Singapore

In Singapore the sharp drop in the rate of population increase was whittled down from 3.3 per cent in 1959 to 1.5 per cent in 1969 - the lowest in Asia outside Japan. This is to be attributed mainly to family planning. Family planning was started in 1952 by the Singapore Family Planning Association (S.F.P.A.). By 1965, when Singapore became an independent republic, it was clear that the scope of the work was beyond the capacity of this voluntary organization, and the government established an official agency under an Act of Parliament - the Singapore Family Planning and Population Board - to augment family planning efforts. Through improved planning, more personnel and greater promotion work, a substantial increase in converts to family planning was achieved. A target was set with the objective of reducing the crude birth rate of the population from 32 per thousand in 1964 to 22 per thousand by 1972 (Chen and Yeh, 1972). One of the reasons why the above target was achieved is probably the rapid improvement in the status of women in recent years - their increasing access to free education and to

paid employment, their rights to property, and other rights under the women's charter passed in Parliament in 1962. Secondly, the Parliament of Singapore passed, in 1969, the Abortion Act and Voluntary Sterilization Act.

The Abortion Board, appointed by the Government, may authorise an abortion to be performed on any of the following grounds: (a) where continuance of the pregnancy would involve risk to a pregnant women, or injury to her physical or mental health; (b) where the environment of the pregnant women, both at the time when the child would be born and thereafter justified an abortion; (c) where there is substantial risk that the child, if born, would suffer from serious physical or mental abnormalities; (d) where the pregnancy is the result of rape, incest or intercourse with an insane of feeble-minded person.

Under the Sterilization Act the following conditions apply: the applicant must be 21 years old or over; the spouse must give written consent; or the person is afflicted with any hereditary form of illness that is recurrent, mental deficiency or epilepsy. The Board, in short, must consider the treatment to be in the best interest of the person and of society. Where an applicant is under 21 years, the consent of the parent or the guardian is necessary (Straits Time, March 1970).

CHAPTER 5

GROWTH OF PUBLIC HOUSING AND SWAMP RECLAMATION SCHEME IN SINGAPORE

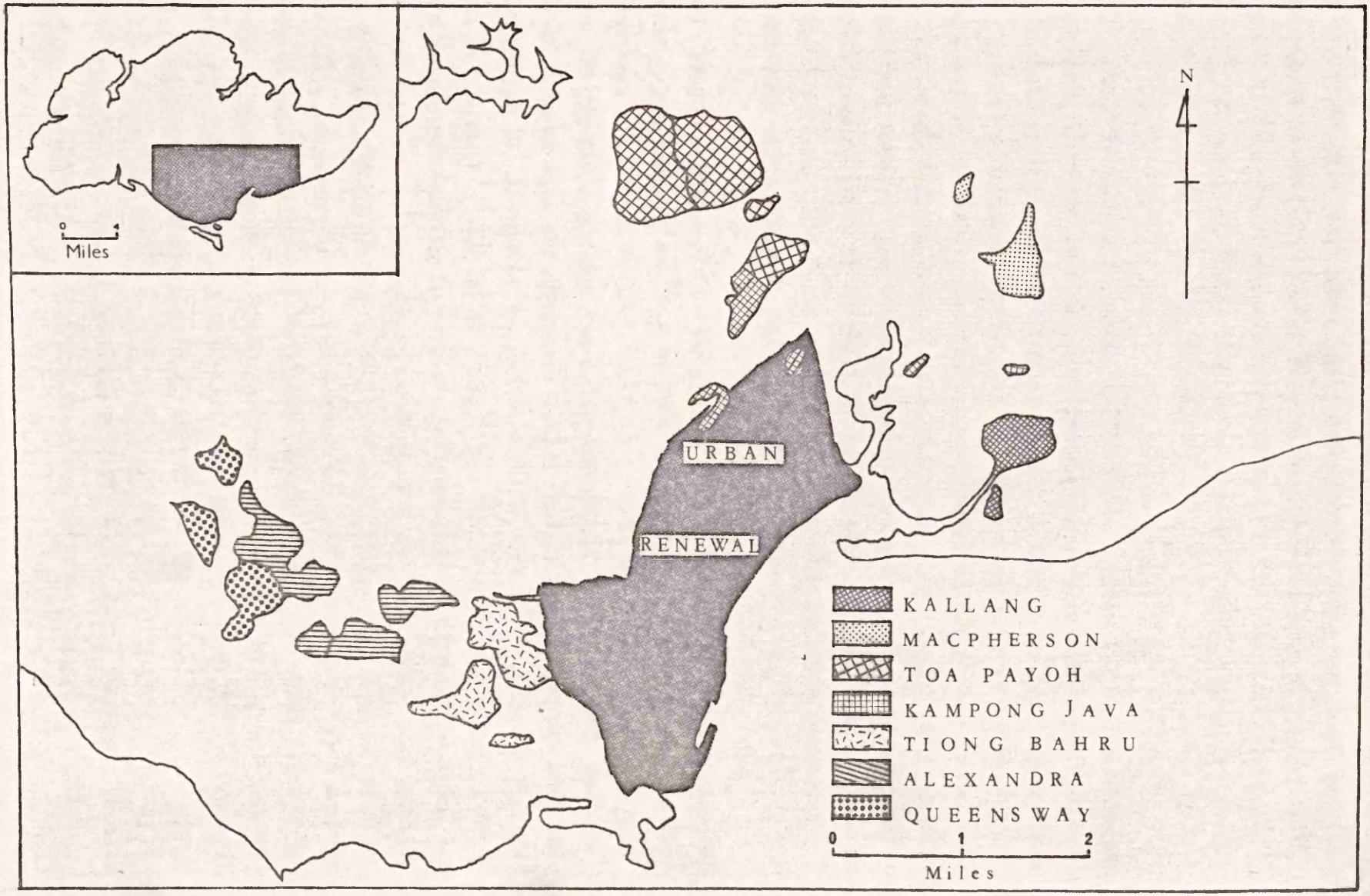
(i) The Pre-war Period. A century of rapid population growth and housing neglect produced urban slums. The Colonial Administration established a Singapore Improvement Trust in 1927 in an attempt to solve part of the housing problem. Its primary functions were to construct back lanes and to work for the general improvement of the city. In terms of housing, its commitments were confined to housing low-income groups rendered homeless because of improvement or sanitary schemes, but on account of shortsighted planning, the houses constructed (mostly in Tiong Bahru) were beyond the budget range of these groups. The Singapore Improvement Trust managed to complete 2,049 apartments (flats) before World War II started; such a meagre production did little to alleviate the housing crisis. Through the lack of whole-hearted official support, the Trust failed to meet its responsibilities in two respects. First, the housing provided was too expensive; secondly, not enough houses were built (Yeung, 1971).

(ii) The Post-war Period. Singapore's population was growing fast and the urgent need was to have more new housing. After the Second World War in 1947, a housing committee was appointed to study the housing conditions further and to make recommendations on re-housing, the type of buildings to be erected, the sites for the buildings as well as the financial implications of such a scheme. The committee drew attention to the deplorable conditions of housing and overcrowding in the central area and recommended that the biggest efforts should be made for the provision of low-cost housing. The Trust began to build on a much bigger scale after the war and had completed slightly more than 20,000 units of low-cost housing during the ~~thirteen~~ twelve post-war years 1947-1959 at an average rate of about 1,700 unit per-annum. Although this was quite a significant achievement compared with those of other colonial

administrations in Southeast Asia, the housing problem in Singapore was so acute that the effort was, in quantitative terms, less than 20 per cent of the requirement (Teh, 1969).

(iii) The Post-1959 Period. When Singapore attained self-government in 1959, urban development had become one of the most massive and serious problems facing the island nation. The establishment of the Housing and Development Board on 1st Feb. 1960, signalled the beginning of effective steps to solve the acute housing problem faced by the community. The Board realised that it had to build quickly, and in quantity, modern low-cost flats in high-rise buildings within and around the city centre. It was estimated that at least 126,710 units of public housing should be built from 1960-1971 to solve the problem adequately. Nearly 37 per cent of Singapore's two million people now live in low-coast flats and the Board aims to house at least half the Republic's population within the next decade (Table 5.2). Simultaneously, the Board had also to undertake the clearance of slums, the redevelopment of urban areas and the development rural or agricultural areas, with a view to resettling farmers away from the city centre in outlying areas to enable them to carry on with their farming activities. The increased constructional work and expansion of the building industry would also help to resolve the acute unemployment problem facing the country by creating much-needed employment opportunities (M.C.f, 1967).

(a) First Five-Year Programme (1960-1966). For its First Five-year Programme, the Housing and Development Board concentrated its main efforts on constructing modern, self-contained estates around the periphery of the city, within a radius of about five miles from the centre, such as Queenstown, Alexandra Hill and MacPherson Road Estate (Map 5.1). The reasons for this initial concentration on peripheral estates were partly bound up with the fact that it was on the city periphery that the Board had land available for more or less immediate development. Development of the peripheral estates has effectively cleared off the housing backlog and at the time has catered for the increase in the city's population.



MAP 5.1 : PUBLIC HOUSING AREAS IN SINGAPORE

In the first five-year plan, which commenced in 1960, the Board set itself the target of building 50,000 housing units at the rate of 10,000 units a year. This target was exceeded and by 1965 the Board had completed over 54,000 units of public housing at a cost of $230 million for more then 250,000 people (Hassan, 1969).

(b) Second Five-Year Programme (1966-1970). Under the Second Five-year Programme, launched in 1966, some improvements were introduced in the design and planning of the housing estate. There were three main lines of advance: continued development of residential estates around the periphery of the city; development of large-scale satellite towns, such as Toa Payoh, Kallang Basin Reclamation, East Coast Reclamation and Jurong Industrial Estate; and Urban Renewal. The programme set a target of 60,000 housing units to be built at an average of 12,000 units a year for 350,000 people. The total cost of the five-year building programme (including urban renewal) comes to $ 380 million (M.C.b, 1972).

(c) Third Five-Year Programme (1970-1975). Under the Third Five-year Housing Programme, from 1970 to 1975, the most important project is the development of Telok Blangah New Town. This new town consists of an area of 932 acres of land bounded by Malayan Railways, Kampong Bahru Road, Telok Blangah Road and Alexandra Road. The topography of the land is undulating and dominated by the Mount Faber Ridge. The Master Plan for the development of the Telok Blangah New Town has been prepared by all the interested parties in both the government and other authorities. The concept of the planning is to develop a new town with a high quality environment, so as to make a positive contribution to the development of housing, industry, tourist and recreation in the Republic. The average rate of construction will be 20,000 units a year, which will quicken the tempo of construction by 50-60 per cent. The Third Five-year Plan, which is now in operation, sets an even higher target of building 100,000 units at a cost of $600 million (Yeung, 1971).

Although the housing estates built by the Housing Board are located within five miles of the Central Business District, all public housing

Plate 5.1: Photograph Showing the Old and New Flats

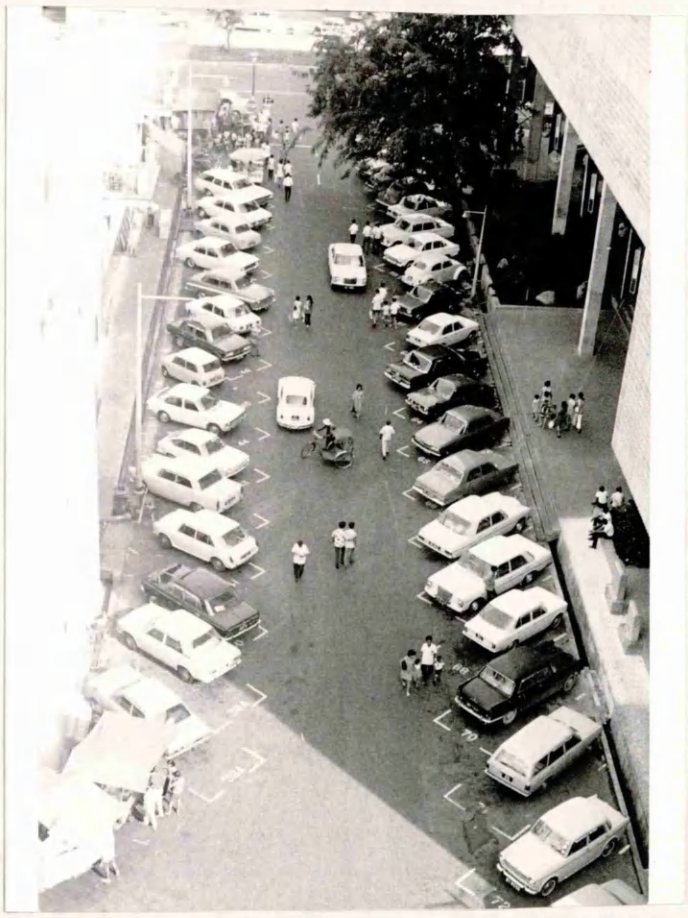


Plate 5.2: A Packed Car Park in the Central Business District

estate are built according to modern planning principles and are designed to be as self-contained and self-sufficient as possible with regard to the provision of schools, shopping and recreational facilities. In other words, these are designed to be self-sufficient satellite towns. In addition to the shopping centres and schools, other communal amenities such as community centres, child health and maternal clinics, playgrounds and open spaces are also provided within the neighbourhood. Each neighbourhood consists of about 1,000 to 5,000 families and whenever more than three neighbourhoods are close together, a town centre or district centre is also built to provide additional facilities such as a post-office, banks, theatres and departmental stores (Teh, 1969).

The following are the various types of flats in the housing estates (Fig. 5.1 & Table 5.1).

One-room Emergency Flat. Consisting of one bed-sitting room, kitchen, bathroom, and lavatory combined and a balcony. The flat has a net floor area of 230 square feet. The rental is $20 per month. One-room Improved Flat. Consisting of one large living and dining room, kitchen, bathroom, lavatory and a balcony. The flat has a net floor area of 310 square feet. The rental is $30 per month. Total cost per unit (excluding land) is $3,630 and selling price is $3,300. By 1971 the Board had completed over 43,077 dwelling units.

Two-room Flat. Consisting of one living and dining room, one bedroom, kitchen, bathroom and lavatory combined and a balcony. The flat has a net floor area of 425 square feet. The rental is $40 per month. Total cost per unit (excluding land) is $4,680 and the selling price is $4,900 per unit. Two-room Improved Flat. Consisting of one living room, one bedroom, one large kitchen, bathroom, lavatory and a balcony. The flat has a total area of 505 square feet. This type of flat is sold to the public at $6,000 per unit.

Three-room Flat. Consisting of one living room, two bedrooms, kitchen, bathroom and lavatory combined and a balcony. The flat has a net floor

area of 550 square feet. The rental is $60 per month and the selling price is $6,200 per flat. Three-room Improved Flat. Consisting of one living room and dining room, two bedrooms, kitchen, bathroom, lavatory and a balcony. The flat has a net floor area of 630 square feet, Total cost per unit (excluding land) is $7,340 and the selling price is $7,800, by the end of 1971, the Board had completed over 49,000 dwelling units.

Four-room Flat. Consisting of one living room, three bedrooms, kitchen, bathroom, lavatory and a large balcony. The flat has a net floor area of 780 square feet. The Board builds a small number of these flats to accommodate people with large families. The flats are rented out at $100 per month. Total cost per unit (excluding land) is $9,200 and the selling price is $12,500 (H.D.B. 1970 a & 1966 b).

The rental charged usually amounts to approximately 15 per cent of the income of the tenant. The selling price is approximately equivalent to 18 months' income of the purchaser. Singapore citizens with a personal income ceiling of $500 or family income ceiling of $800 are eligible to apply for rental of Housing Board flats. The living rooms range in size from 140 square feet to 170 square feet while the bedrooms are from 120 to 140 square feet, All the flats are provided with piped water supply, electricity for both light and power, gas for cooking and heating and water-borne sewerage. The majority of the flats are built in blocks ten-storeys high, but some are only two-storeys high and others twenty storeys high. The different heights of the buildings have been introduced into the estates to provided for a varied skyline and also to give individual character and identity to the housing estates.

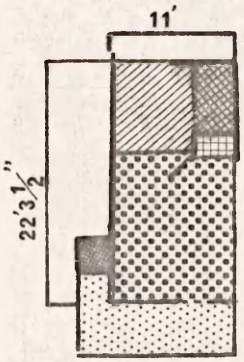
Further the Board introduced new types of flats for sale. Under the "Home Ownership for the People" scheme, launched in 1964, citizens in the lower and middle income group are enabled to purchase flats. In 1971 the family income limit for eligibility to purchase flats was raised from $1,200 per month to $1,500 per month. Simultaneously the

Table 5.1

Units Under Management by Housing and Development Board (at end period), 1961-1971

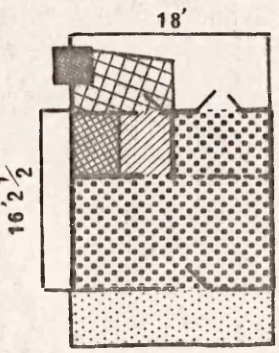
Year	Total	One room	Two rooms	Three rooms	Four rooms
1961	26,168	2,397	9.653	12,028	2,090
1962	37,374	6,189	13,185	15,912	2,088
1963	43,889	6,483	14,702	20,547	2,157
1964	54,312	7,923	17,488	26,742	2,159
1965	69,660	16,891	20,884	29,670	2,215
1966	80,915	23,653	24,776	30,267	2,219
1967	84,683	24,298	25,812	31,894	2,679
1968	95,573	29,463	27,036	36,367	2,707
1969	108,823	36,844	27,407	41,878	2,694
1970	118,544	40,781	28,983	45,992	2,788
1971	126,710	43,077	30,717	49,682	3,234

Source: Department of Statistics (1972), Yearbook of Statistics, Singapore, 1971/1972



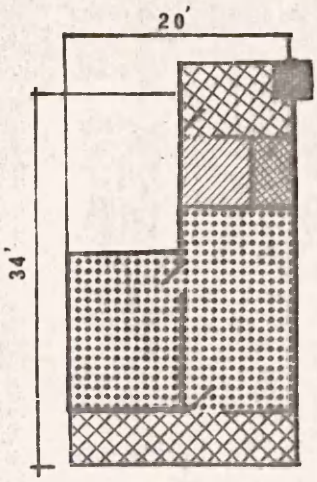
1-ROOM UNIT

Approx. Living Area:
230 sq. ft.
Inclusive Estimated Cost:
$2,000



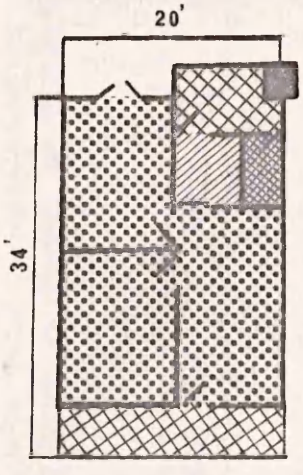
IMPROVED 1-R.UNIT

A.L.A: 310 sq.ft.
I.E.C: $2,800 (1966)
$3,300 (1969)



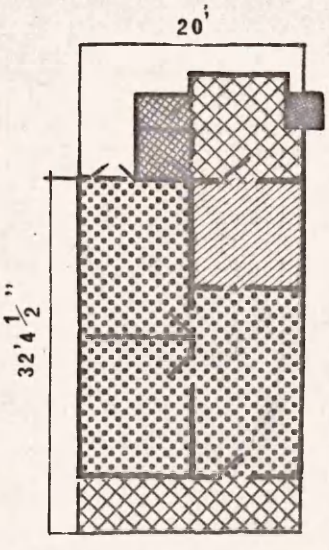
2-R. UNIT

A. L. A: 425 sq. ft.
I. E. C: $3,800 (66)
$4,900 (69)



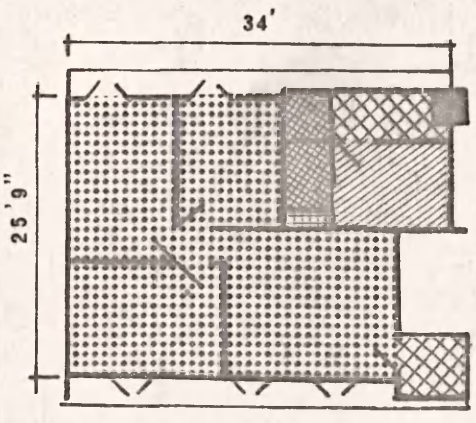
3-R.UNIT

A.L.A: 550 sq. ft.
I.E.C: $4,900 (66)
$6,200 (69)



IMPROVED 3-R.UNIT

A.L.A: 630 sq. ft.
I.E.C: $5,700 (66)
$7,800 (69)



4-R.UNIT

A.L.A: 780 sq. ft.
I.E.C: $7,000 (66)
$12,500 (69)

Corridor
Bed Room
Kitchen
Bath & W.C.
Shelves
Refuse Chuse
Balcony

The I.E.C. Comprises The Following:
1. Building
2. Sanitary
3. Electrical
4. Lift
5. Piling
6. Earthworks
7. Roads & Car Parks
8. Other Services

FIG. 5.1 : ROOM-TYPE PLANS IN H·D·B·
Copy from: H·D·B., Annual Report 1966 & 1969

Table 5.2

Population House in Housing Development Board Flats, 1960-1971

Year	H.D.B. flats number built	Percentage of total population living in H.D.B. flats
1960	1,682	9.0
1961	7,320	11.3
1962	12,230	15.3
1963	10,085	18.28
1964	13,028	22.1
1965	10,085	23.2
1966	12,659	24.4
1967	12,098	25.9
1968	14,135	29.0
1969	13,096	32.0
1970	14,251	34.6
1971	16,147	37.4

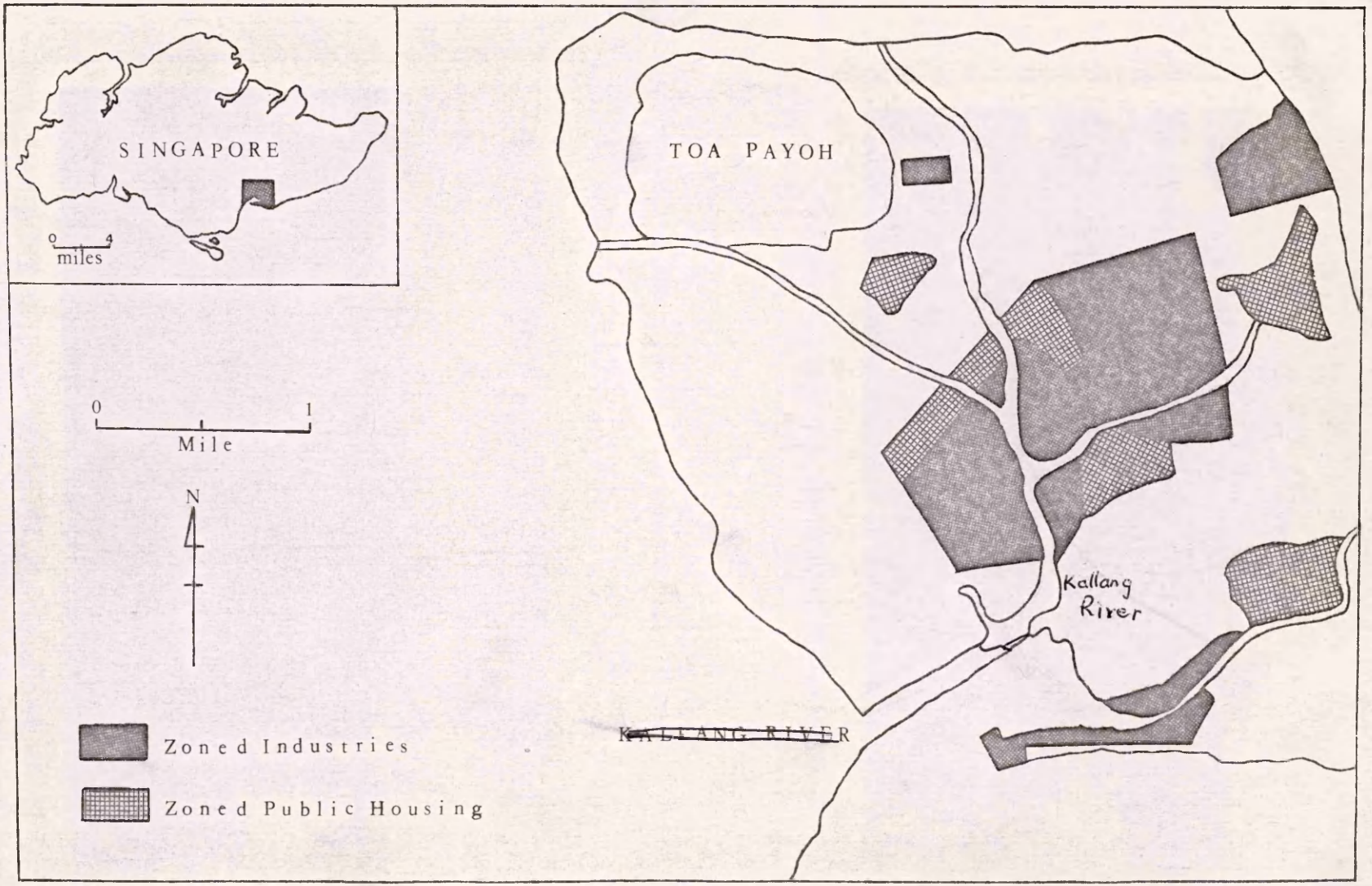
Source: Ministry of Culture. Singapore Year Book, 1972. p.XI

Board also announced that it would build bigger five-room type flats. The five-room flat would have an approximate floor area of 1,300 square feel or 120.8 square metres and the first few blocks of these units were completed by early 1974. The selling prices of one-room, two-room, three-room (improved) and four room flats are $3,300, $4,900, $7,800 and $12,500 to $15,500 each respectively. The selling prices of five-room flats vary from $22,000 in new towns and $27,500 in suburban areas to $33,000 in urban areas (M.C.a, 1969-72). The policy of the Board is to keep the sale prices of its flats as low as possible to enable as many citizens as possible to become home-owners.

Reclamation was undertaken in view of Singapore's limited space area and the ever-growing demand for land to meet the requirements of Singapore's growing population and development projects. Two major reclamation projects were included in the second five-year plan, one reclaiming about two square miles from the sea off East Coast shoreline of Singapore and the other at the Kallang Basin comprising one square mile. Both of the land areas reclaimed are suitable for public housing, tourist projects, urban and industrial development.

(a) The Kallang Basin Reclamation: The Kallang Basin is a tidal swamp situated close to the heart of Singapore city. The earth is taken from the hills by special transport and conveyance belt arrangements. The authorization to proceed with the Kallang Basin Reclamation project was given in 1963 and by 1969 the reclamation was completed. The cost of this development is estimated to be $28.5 million (H.D.Ba, 1970). The reclamation of Kallang Basin and adjoining areas will yield about 400 acres of land; two-third of the reclaimed area is zoned for intensive industrial uses, the reclaining one-third is allotted for public housing (Map 5.2).

(b) The East Coast Reclamation: The East Coast Reclamation stretches approximately six miles (9.7 square kilometres) along the East Coast of Singapore, from Bedok to the tip of Tanjong Rhu, and is about one mile wide from the sea, covering an area of more than 1,000 acres of land. The reclaimed area is nearly 2 square miles (5.1 square Kilometres) of

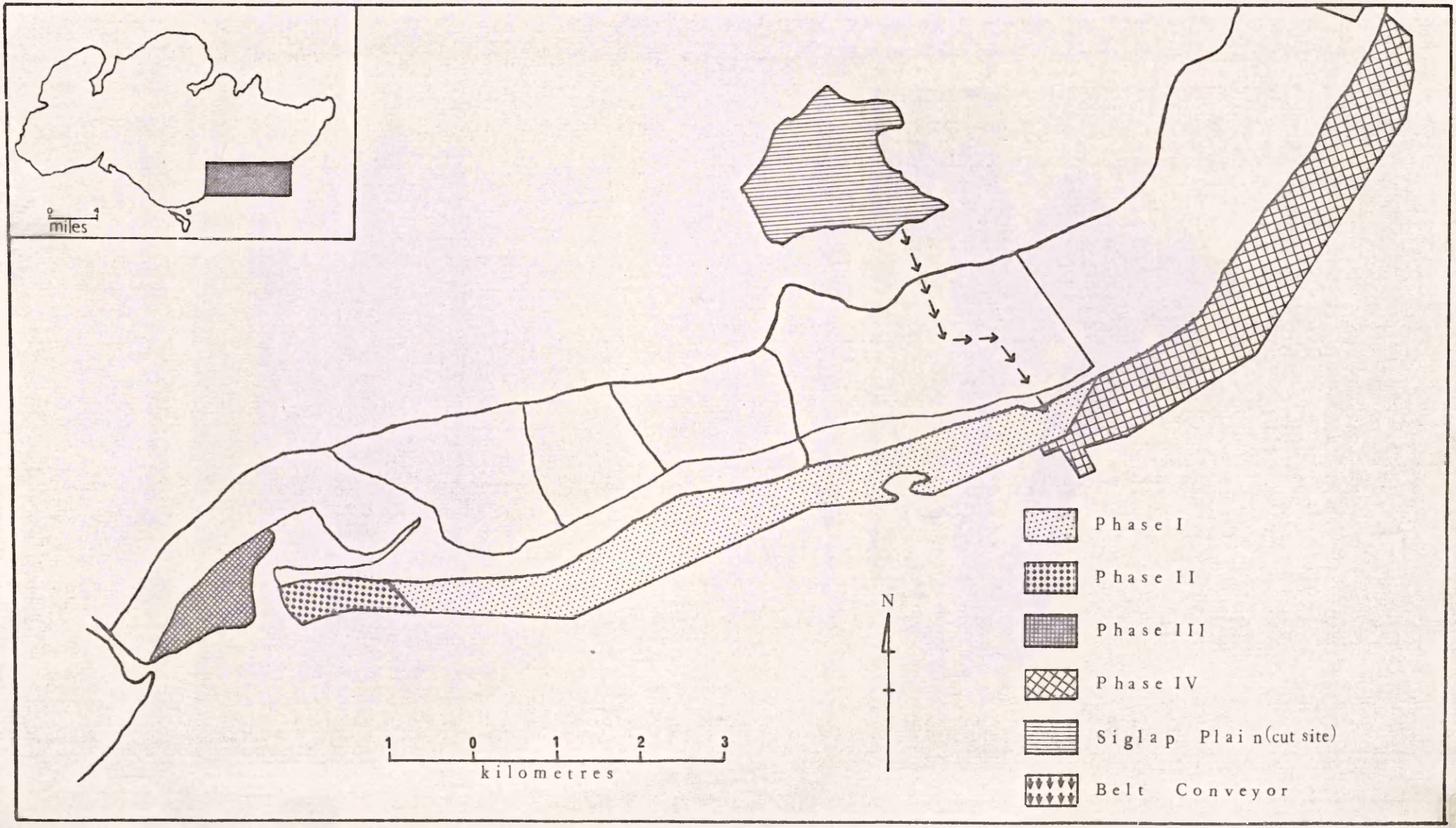


MAP 5.2: KALLANG BASIN RECLAMATION SCHEME

Plate 5.3: Part of the Kallang River Estuary

Plate 5.4: The Reclamation of Kallang Basin Will Be Used for New Industries and Public Housing Estate

developed land and is to be added to the 224 square miles of the present reclaimed area. The soil for the reclamation project has been obtained by levelling out a hill from Siglap Plain, the earth being cut away by bucket wheel excavators and transported by an automatic conveyor belt system through tunnels under Upper Changi Road and by bridge across East Coast Road in a completely mechanised operation. The East Coast Reclamation scheme began in 1965 and is expected to be completed in 1975. It is the biggest reclamation project ever undertaken in the republic. Under the first phase of the East Coast foreshore reclamation project, 1,000 acres of land from Bedok to the Singapore swimming club at Tanjong Rhu were completed in 1969, and the second phase reclamation of 125 acres from the Singapore swimming club to the tip of Tanjong Rhu. The contract for this project has been given to a Japanese firm. The costs of the two reclamations alone is estimated to be over $155.5 million (H.D.B, 1966 & 1969.b). Phase three and four of the East Coast Reclamation work commenced in 1971. Phase three involves the reclamation of 165 acres of land from Tanjong Rhu to the mouth of the Singapore River. This will connect with more reclaimed land in the Kallang Basin. Phase four is the largest phase, involving 1,350 acres of land stretching from Bedok to Tanah Merah Besar to be reclaimed. The respective costs of the two new schemes are estimated at $23.5 million and $35 million. Phase three is expected to be completed in 1974 and phase four in 1975 (Map 5.3). On this reclaimed land will run the much-needed coastal expressway into the city. There will also be recreational residential and other mixed-type urban development (Straits times, 1971).



MAP 5.3 : EAST COAST RECLAMATION SCHEME

Plate 5.5: Work in Progress at the East Coast Reclamation Site

Plate 5.6: The Second Phase of the East Coast Reclamation

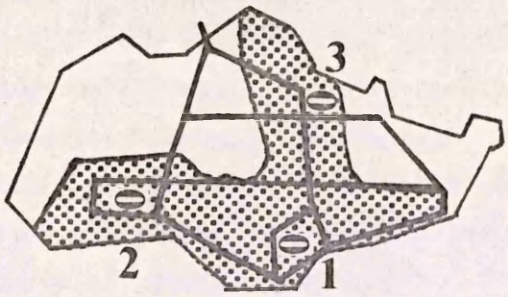
CHAPTER 6

THE PATTERN OF URBAN DEVELOPMENT AND SATELLITE TOWNS

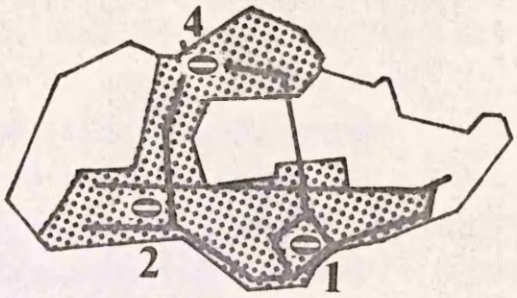
The main aims of the State and City Planning Project are to prepare a long-range land allocation plan and programme, and a balanced road and mass transit system, to guide the government's current and future programmes in housing, urban renewal, industrial development, road and transport development, and other infra-structural development. The forecast by city planners projects a twenty-first century Singapore with a population of four million. It is expected that before 1980, 80 per cent of the population will live in flats. This figure, however, is not expected to change in the years after, for by that time demand for land for commerce and industry will be such that only a quarter of the Island's total area can be allocated for residential purposes. This trend has emerged from the following facts: 85 per cent of Singapore's two million population today live on about 28 sq. miles which are occupied by flats for 750,000 people. The remaining 15 per cent of the population stay above shops or other places of work. In the city core (three sq. miles in area), 65 per cent of the buildings are deteriorating or dilapidated, and are being broken down under the urban renewal programme. Only 1.25 per cent of the buildings are in good condition (M.C.b, 1971-72).

The pattern of Singapore's massive public housing has helped give the plan its title of the Ring Plan. The considerations for planning a series of urban settlements, linked in a ring fashion, are proximity to employment centres (for example, the city centre and the port, Jurong and major industrial estates at Sembawang and Woodlands), land availability, public ownership of lands, and opportunities for minimizing public travelling costs. Five urban development patterns may be mentioned for study and comparison as to their relative merits (Map 6.1). The "East Band Pattern" provides for urban development which distributes population and employment east of the water catchment reserve, linking the "Town Map Area" to Sembawang, Seletar and Punggol. The West Band Pattern, on the other hand, provides

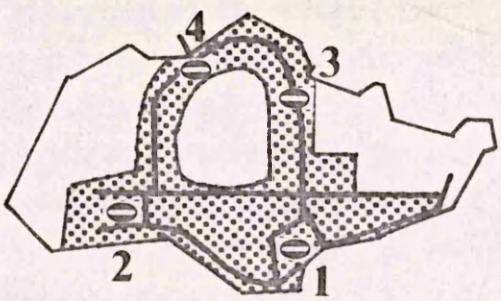
The East Band Pattern



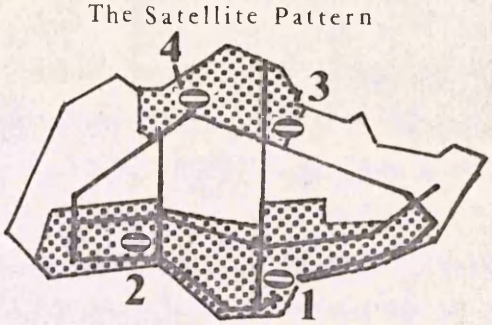
The West Band Pattern



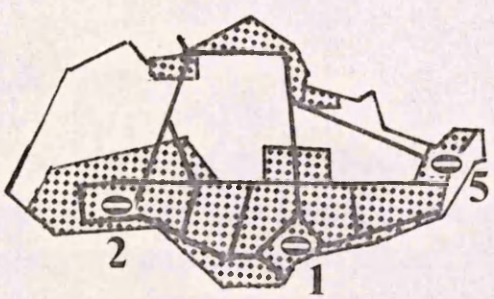
The Ring Pattern



The Satellite Pattern



The Dispersed Pattern



1 Centre Town

2 Jurong Town

3 Sembawang & Seletar

4 Woodlands & Kranji

5 Changi

Developed Area

Major Road

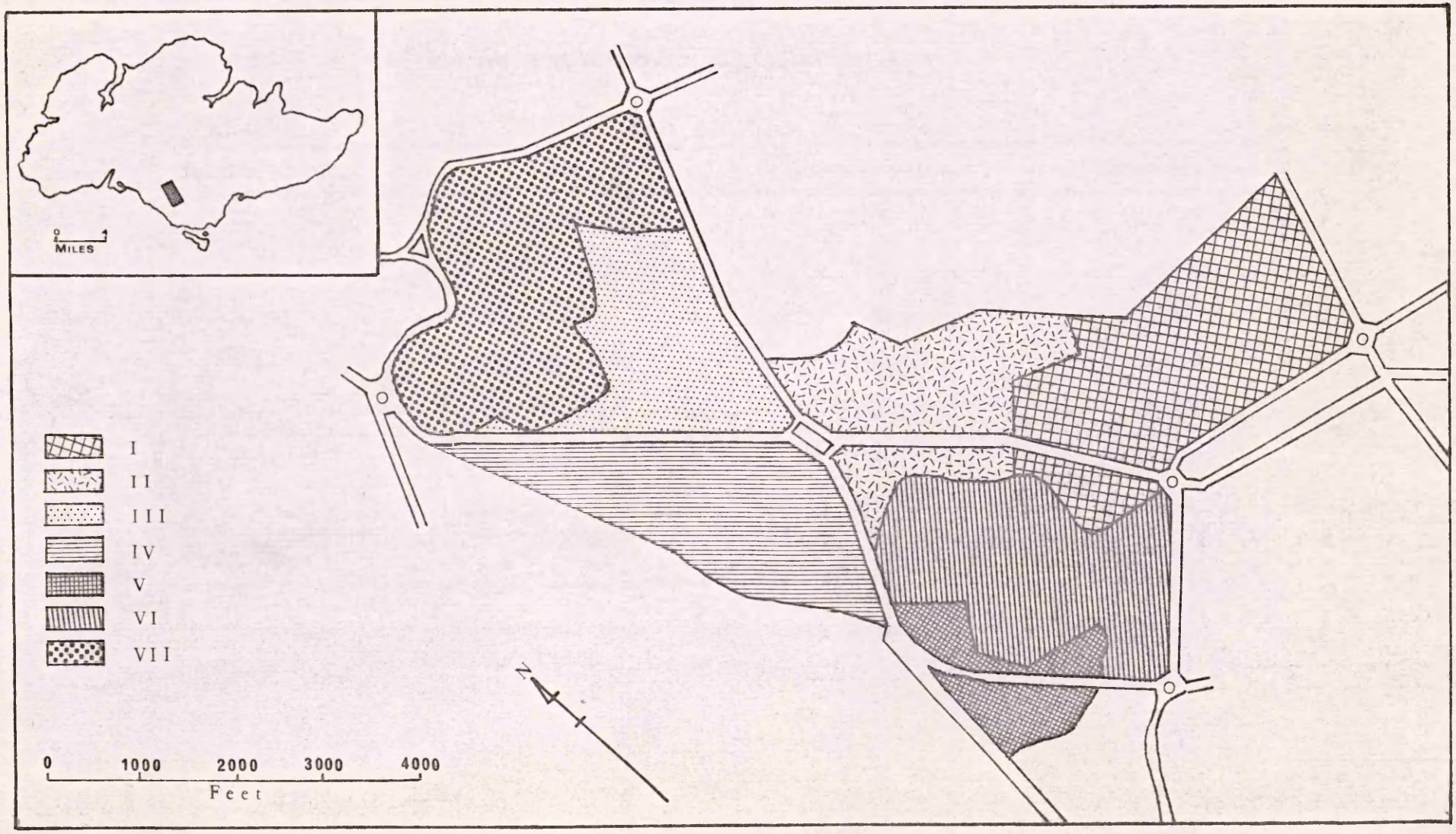
MAP 6.1: FIVE URBAN DEVELOPMENT PATTERNS IN SINGAPORE

for urban development on the west of the water catchment area linking the city with Sembawang and Kranji. The Ring Pattern, distributes urban development around the water catchment area linking the city with Sembawang, Seletar, and Kranji. The Satellite Pattern, concentrates population and employment at Sembawang and Kranji as a separate urban growth point from the Town Map Area. Finally, the Dispersed Pattern, in which population, employment and urban development distributed in pockets outside the Town Map Area.

All these different patterns of development embody a common feature, and that is the relatively heavy concentration of urban development along the southern coastline. This is to take into account existing development and the likelihood of such development being intensified, both along the periphery of the urban area and on undeveloped lands within this urban area. In accommodating the inevitable intensification of development within the urban area, the opportunity is also taken to suggest a mass rapid transit route along the densely populated belt extending from Queenstown to Toa Payoh. It will therefore be seen that the different urban patterns vary mainly in respect of development proposed or expected outside of the southern coastline. The five urban development patterns are currently being compared and evaluated against traffic costs, infrastructure costs, and housing and environmental standards to determine their relative merits. The object of the planners is to derive an appropriate urban development pattern that will best meet the needs of future urban growth in Singapore (Tan, 1969).

(i) Queenstown

The Planning district of Queenstown is the first satellite town in Singapore. The major part of it was developed during the First Five-year Building Programme (1960-1965). It is located in the south-west of the island, five miles from the city centre. This area is approximately 525.71 acres (S.I.T, 1958). In all there are seven neighbourhoods in Queenstown. Satisfactory progress has been made towards developing two additional neighbourhoods in this new town. Exhumation of the graves



MAP 6.2 ; QUEENSTOWN NEIGHBOURHOOD PLAN

Table 6.1

Construction Programme of Queenstown, 1952-1969

Neighbourhood	Year	Areas (acres)	Flats (units)
N.I	1952-1960-1964	125	2,227
N.II	1956-1966 Ext. 1969	103	2,528
N.III	1962-1964	80.4	3,838
N.IV	1960-1964-1967	110.93	4,878
N.V	1960-1963	41.78	1,896
N.VI	1966-1968	64.6	4,005
N.VIII	1969-1972	224.29	7,000
Total		750.0	26,372

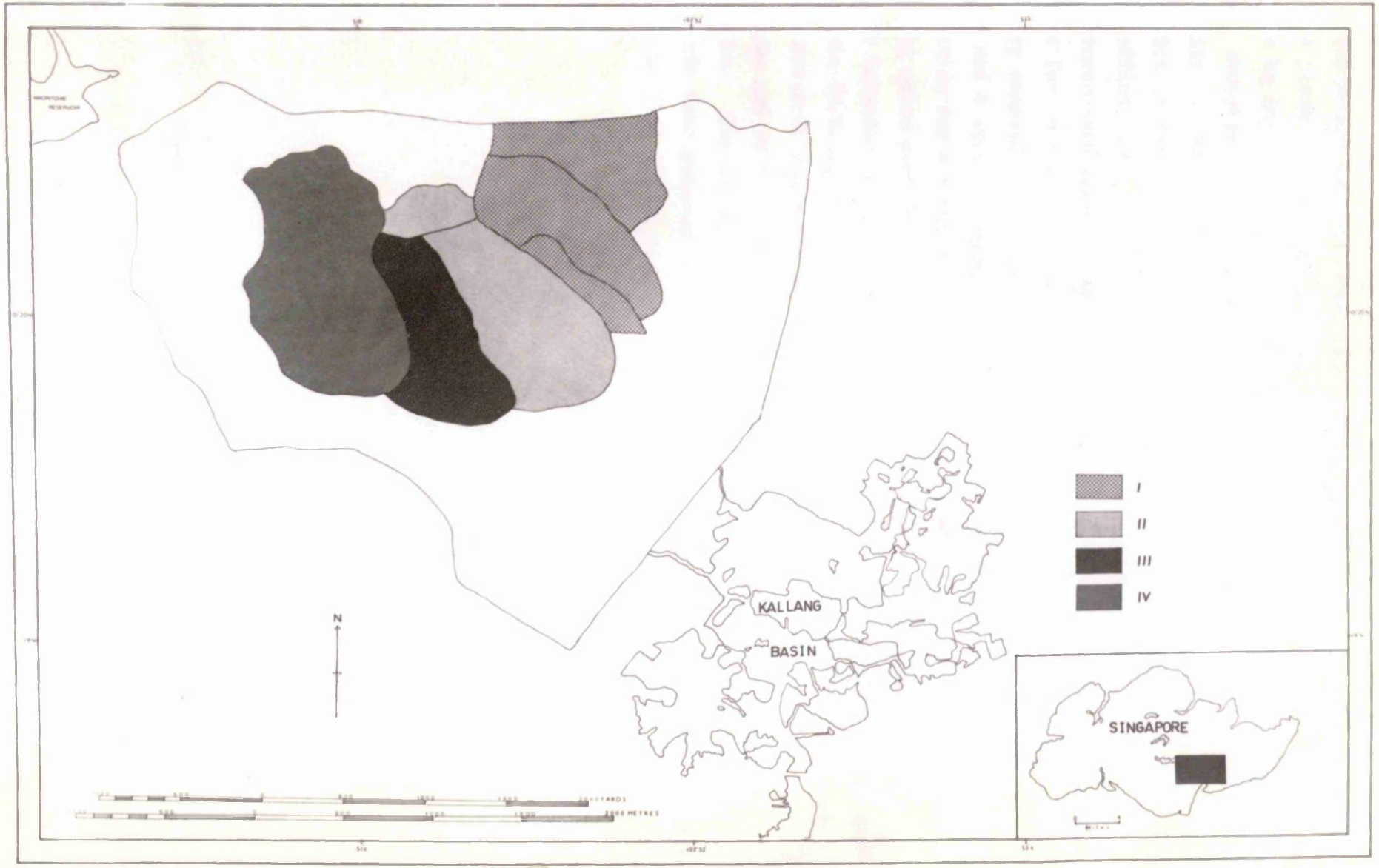
Source: Housing Development Board (1970), First Decade in Public Housing, 1960-1969, Singapore

in neighbourhood VI was started during the 1966 and completed by the end of 1968. This area is approximately 64.6 acres and planned to have 4,005 units. The acquisition of the land for neighbourhood VII was completed after protracted negotiations. Exhumation of the graves started by the end of 1968 and completed during the 1972. Construction work has planned to have 7,000 units and an area of about 224.29 acres (Map 6.2). There are seven neighbourhoods with 27,000 housing units and 160,000 population (Table 6.1).

Queenstown was the first of the new towns, and has a population of 160,000 in 27,000 dwellings, planned in neighbourhoods including cinema, shopping centres and markets, emporium, restaurants, schools, health clinics, a Japanese garden and other society community centres on a self-contained basis (H.D.B.b & c, 1964-69). Furthermore, the construction of the district library and sports complex, comprising 5 swimming pools, an Olympic-size running track and a football field was ready for use in early 1970. In addition several factories in Tanglin Halt, the Queenstown light industrial area, were extended. The policy of offering houses to those people in greatest need means that in the early stages of the growth of Queenstown there are people working in the industrial area who are not living in Queenstown. However, over a period of years this position should adjust itself and eventually a large number of those employed in the neighbouring industrial area would be housed there.

(ii) Toa Payoh:

Toa Payoh is the second satellite town and is located four miles to the north of the city centre. Its construction was begun during the second five-year programme (1966-1970). It was proposed to construct about 36,000 units of flats and shops in the four neighbourhoods and a town centre at the 620 acres site. When completed it will house a population of 175,000 to 200,000 and will be much more self-centained than Queenstown. It will also be the largest and most heavily populated satellite town (H.D.B.a, 1970). The proposed new town will consist of



MAP 6.3 : TOA PAYOH NEIGHBOURHOOD PLAN

four neighbourhoods with four shopping centres and one town centre. The layout plans of Toa Payoh Town Centre, finalised at the end of the year and to be implemented in 1970, contained designs for the biggest pedestrian shopping complex and the biggest bus terminus, with a parking facility for 300 buses, in Singapore. Furthermore, two cinemas, a district library, an emporium, a child health and maternity centre, a post office, 190 shops and generous paved plazas with fountains and sculptures were constructed and 800 carparks were provided in the shopping centre for both the shopkeepers and their customers. The new towns quickly emerged as communities, the shopping centres in neighbourhoods 1,2,3 and 4 were all completed to provide the full range of shopping facilities for a population of approximately 95,000 living in the 18,834 housing units comprising mostly the one room improved type which is mainly intended for rental and three-room improved type specially designed for sale (H.D.B., 1966-1969 b). Traffic coming into the town from the major arterial roads are by means of flyovers. Easy accessibility to the town and to the city centre is a marked improvement over previous projects. The collector roads form an inner-ring road dividing the town into four neighbourhoods. Each neighbourhood is by a local shopping centre located within easy walking distance of the residences (Map 6.3).

Plate 6.1: View of Block of Flats in Queenstown

Plate 6.2: Multi-storey Flats at Toa Payoh, a Satellite Town in Neighbourhood II

CHAPTER 7

GENERAL REVIEW OF THE JURONG NEW TOWN PLAN

Jurong New Town, the largest industrial estate in Singapore, is situated in the southeast corner of the island of Singapore. The site is about 10 miles from the heart of the commercial district and less than that from the Singapore's Harbour Board dock area. Jurong offered itself as a good prospect mainly for the following reasons:

(a) The area was still largely rural in nature and sparsely settled. The area was covered by mangrove swamps and partly by some low hills of less than 250 feet high. The levelling of these low hills could provide suitable soil for the reclamation of swamps. The area included large tracts of land in public holdings. Cumbersome and time-consuming land acquisition exercises could therefore be reduced considerably.

(b) The water around the coasts in the area was generally deep with a big group of sizeable off-shore islands situated in even deeper water just south of the area. It thus offered a unique asset, the possibility of developing an industrial town in conjunction with deep water berthing facilities in the form of a port. In addition the Jurong coast has a maximum tidal range of 11 feet and a maximum tidal flow of only about 1.5 knots, and it has no silting problem. Jurong Estuary is suitable for navigation. Industrial water supply could be arranged from Jurong catchment from an impounded Johore Strait or from treated sewerage effluent into Jurong (Fong, 1971).

In addition, Singapore can no longer depend mainly on her commercial sector to provide employment for her young and growing population. The solution to the unemployment problem must be found in industrialisation. This urgency was reinforced by the studies of a United Nations Industrial Survey Team to Singapore in 1961. The Team estimated that a minimum of 10,000 jobs a year would have to be provided by the industrial sector between 1961 and 1970, and seriously urged the implementation of a rapid "crash" industrialization programme. Jurong was recommended as

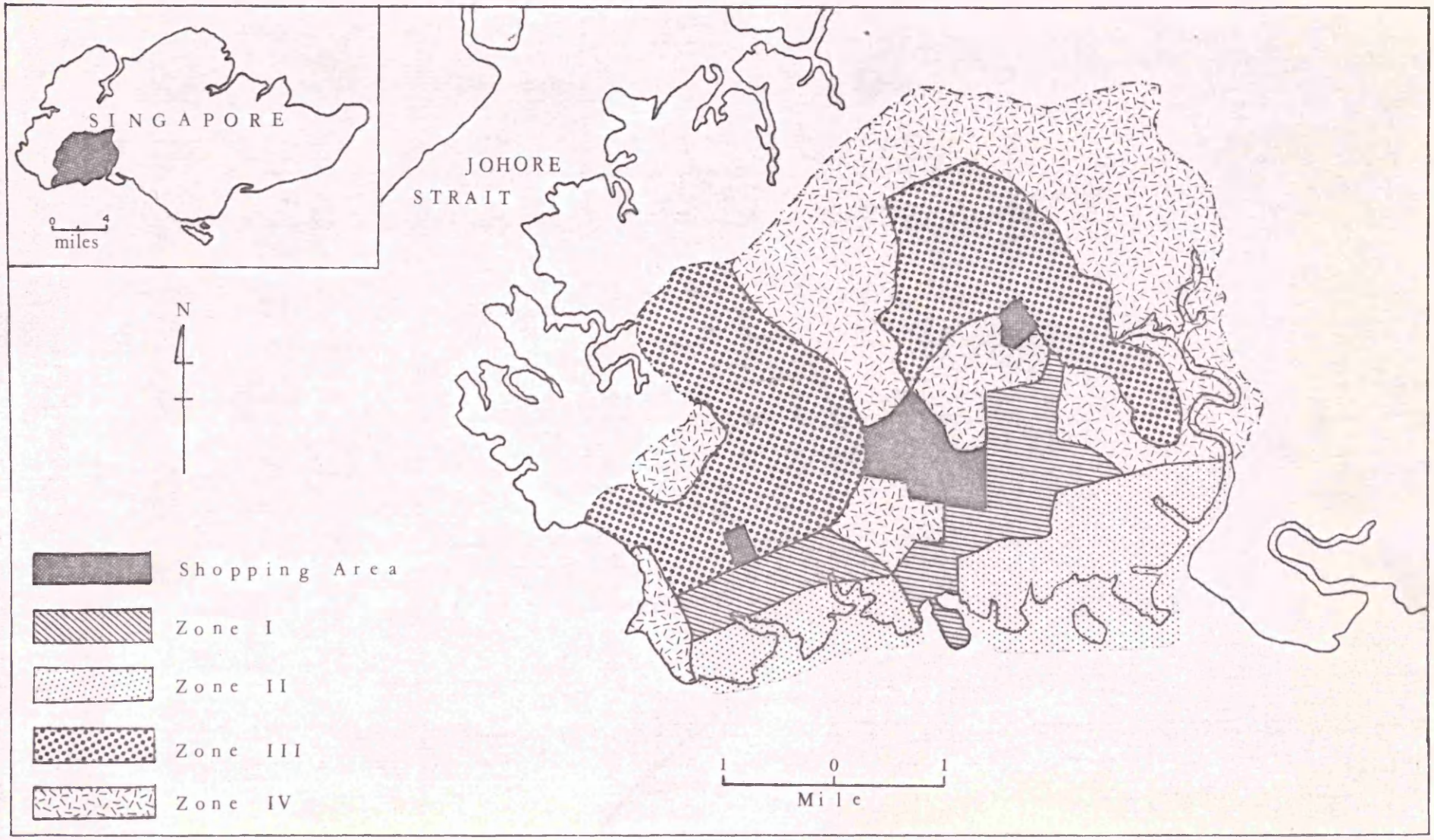
Singapore's main industrial centre where the government could focus all its efforts and investment to create a fully-serviced, ideal industrial location for all types of industries and where thousands of Singapore's young people would be able to find jobs (Hanna, 1964).

The Jurong Industrial Estate Project was first drafted in 1961, and changes were made later. The total area of Jurong Industrial Estate has increased to over 16,000 acres, with more and more land reclaimed at a rapid pace. The core of the plan is divided into four zones (Table 7.1 and Map 7.1). First zone of Jurong - about 3,880 acres (22.6 per cent) - is zoned for heavy, semi-heavy and general industry, light industry and special industry. Second zone - about 230 acres (1.4 per cent) - is zoned for wharf and lighter area. Third zone - about 5720 acres (33.7 per cent) - is zoned for residential area, shopping centres, service industry and town centre. Another zone, about 7170 acres (42.3 per cent), is zoned for Nanyang University, Telecommunication, War Dept., Open space and special land use (Chiang, 1968).

(i) Industry and Wharf Area:

Three important types of manufacturing are located in the Jurong industrial area. First, metals and engineering are concentrated mainly in Pulau Samulun (Jurong Shipyard and the National Iron and Steel mills), Jalan Ahmad Brahim and Jalan Utasan. The second is wood and paper products, which are along the bank of Sungei Jurong and Jalan Papan. The third area is textiles in the light industrial area between Jalan Tukang and Jalan Ahmad Brahim, except for one at the corner of Jalan Utasan and Jalan Perusahaan (Nanyang University, 1967).

Jurong, which is Singapore's main bulk-handling port, deals with over one million tons of cargo annually, and over a thousand vessels call there each year. It is administered by the Port of Singapore Authority. Jurong is thus a progressive development as a massive industrial estate with a natural deep-water harbour. It has set a



MAP 7.1 : THE JURONG INDUSTRIAL ESTATE PLAN

Table 7.1

Four Zones in Jurong Industrial Estate

Zone	Area (acres)	Percentage
Zone I	3,880	22.6
Zone II	230	1.4
Zone III	5,720	33.7
Zone IV	7,170	42.3
Total	17,000	100.0

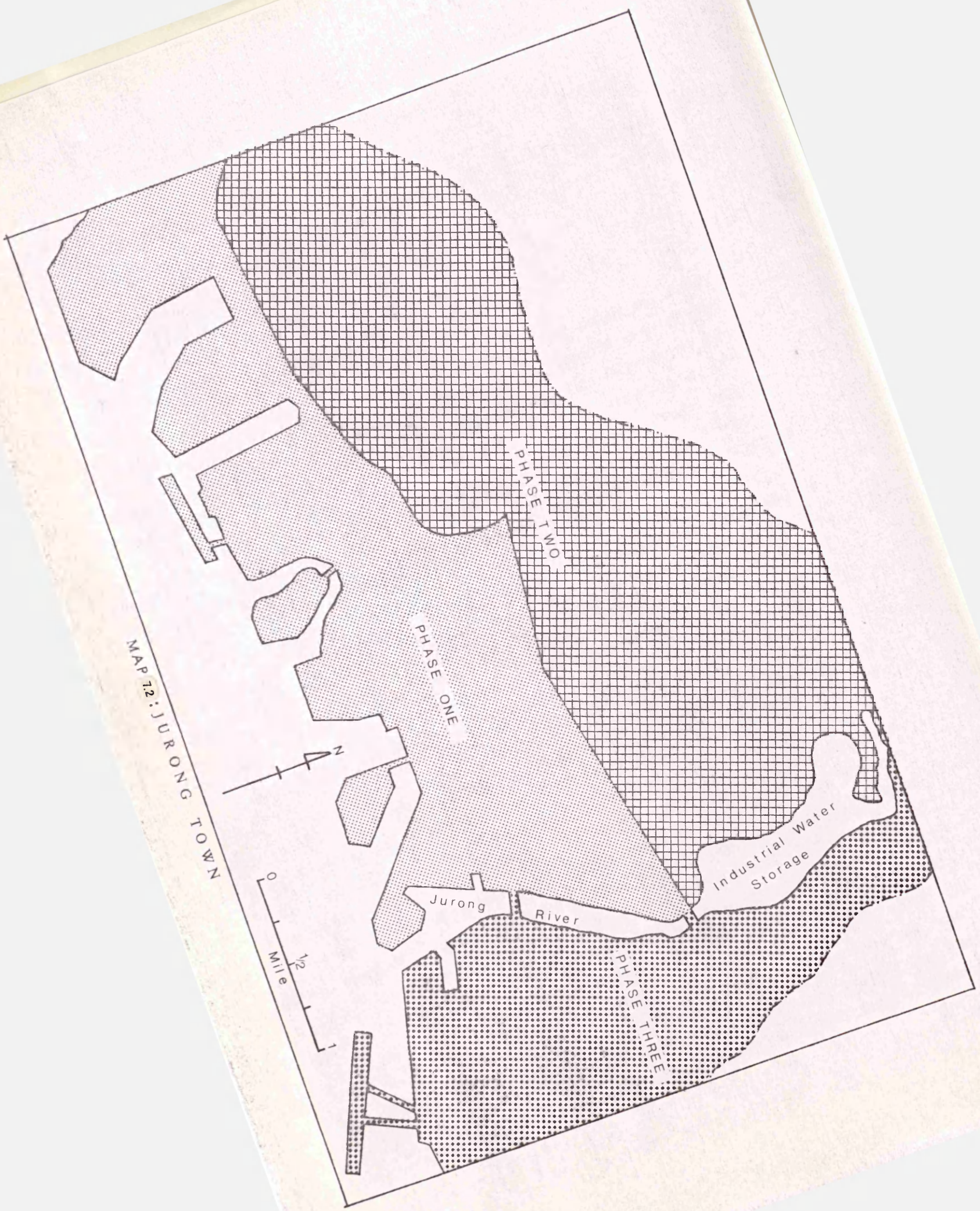
Source: Tao-Chang Chiang (1969), The Jurong Industrial Estate p.11.

pattern which will be difficult to match in the Southeast Asia region. A port with 3,000 ft deep-water wharf and 1,260 ft of coastal and lighter wharfes now serve the town. In 1970 Jurong became busy enough to be officially renamed Jurong port. The facilities available in the port are modern and include a fully integrated bulk cargo handing system capable of handling dry bulk cargo at an average rate of 300 tons per hour. The system is being extended and will be served by two more cranes with a total capacity of 90 tons per hour (Seah, 1970).

(ii) The Plan of Jurong New Town

The Jurong New Town plan's expansion programme, when completed, will increase the size of Jurong town to over 10,000 acres. The first phase development of this town covers an area of about 3,650 acres and this was completed in 1968 to make preparation for the light industries, the heavy industries and the reclamation works for the Jurong harbour. Its industrial sites, complete with services such as domestic water, drainage and electricity, have been mostly taken up, but some still remain. The second phase of development is to the west of Jalan Boon Lay. Several hills were levelled and part of the material used to complete reclamation along the West bank of the Jurong River. Its 5,400 acres have already been prepared and allocated to industries and residential zone. In the third phase, a smaller area of 1,300 acres to the east of the Jurong River is nearly complete and has overtaken the much larger second phase - a vast 5,400 acres stretching westwards from Jurong town to the sea. The total size of the whole complex, when it is finally completed and fully operational in the 1980's, will be 12,000 acres (Straits times b, 1970). The 30,000 workers (1970 Dec.) employed in Jurong will have risen to 70,000 and there should be over 500 factories (Map, 7.2).

The Jurong Town Corporation came into being in 1968, with the duties of providing facilities for the management of industrial estates and sites in Singapore and amenities for the advancement of the well being of the people living and working in such industrial estates and sites.



MAP 7.2: JURONG TOWN

Jurong residential "New Town" which is being undertaken by the Housing and Development Board, and the physical planning of the entire Jurong new town area has been passed to the urban renewal unit of the Housing Development Board to develop the residential neighbourhood in this industrial satellite Town. Jurong New Town has a population of about 21,000 people. By 1980 it is estimated that the total population of Jurong Town will reach about half a million population. Jurong New Town will be a self-contained satellite town, with better housing, better schools, shopping centres, recreational facilities, sport complexes, swimming pools and cinemas. There are about 6000 units of low-cost flats and 150 shophouses; over 3,000 more flats of the improved type are now under construction; and they will continue to be built until the needs of the workers for accommodation are satisfied (J.T.C., 1970).

The units so far built in the estate are classified as low-cost dwellings and, as such, were originally intended to satisfy the demands of the lower-income groups. There are single-room, double-room and three-room apartments with full facilities. A very favourable response was received for all types of accommodation in Jurong. In addition, the social amenities and facilities include a regular bus service, a children's playground, a primary school, two markets, several banks, clinics, a hospital, Jurong Park, Jurong Hill Garden, Jurong Bird Park and the Jurong sports complex. The resettlement problem is the bottleneck to the development of the Jurong estate and it is due mainly to the strong resistance encountered in resettling farming and other squatters occupying land earmarked for industrial development, and by the scarcity of lands for resettlement (Planning Dept., 1962).

Plate 7.1: Aerial View of the Deep-water Wharf Area in Jurong Industrial Estate

Plate 7.2: Panoramic View of the Public Housing Estate in Jurong New Town

CHAPTER 8

URBAN RENEWAL PROGRAMME IN SINGAPORE

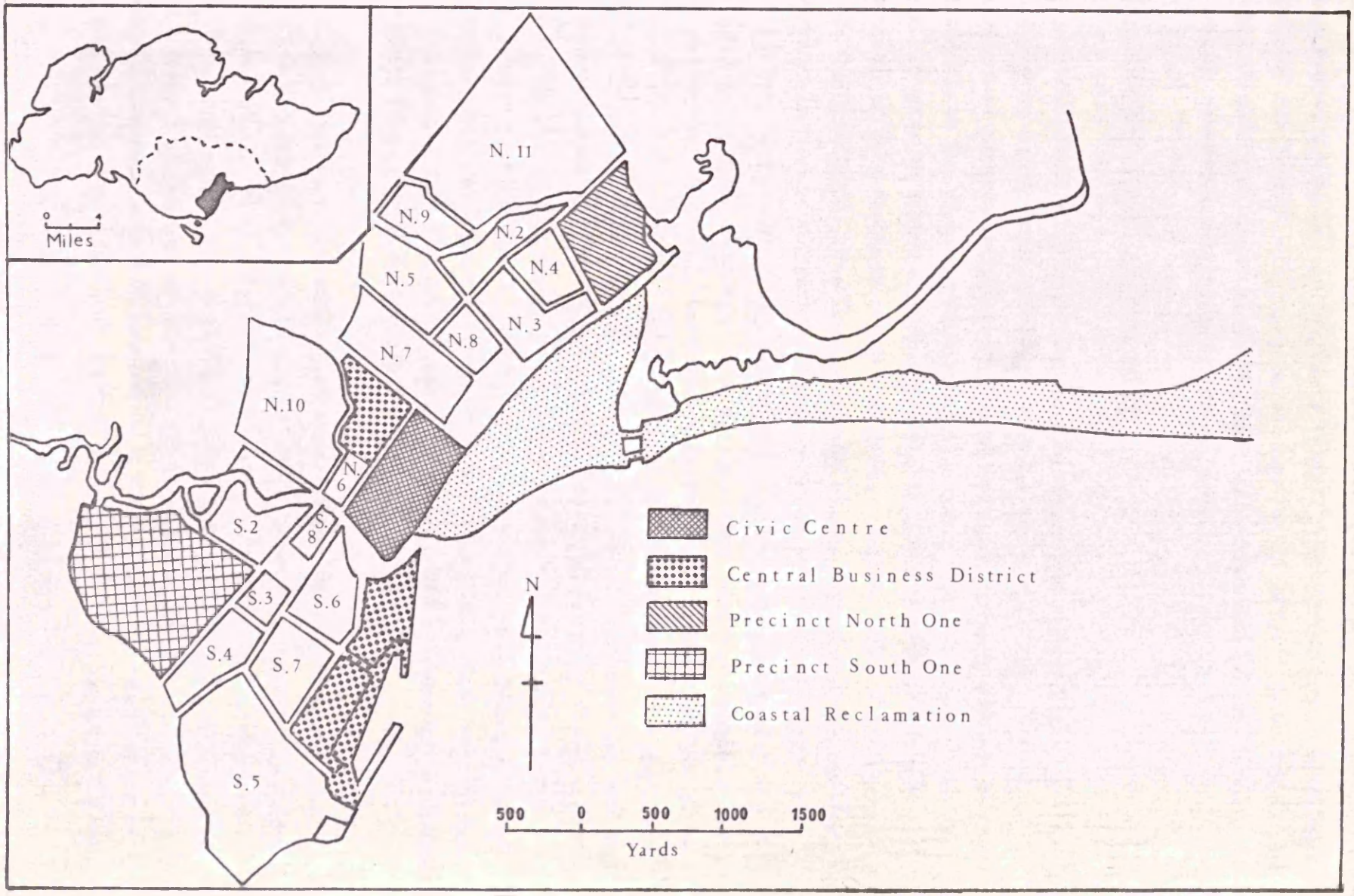
The urban renewal of the central area is one of the many striking manifestations of Singapore's present dynamic progress. Urban renewal does not mean just the construction of low-cost housing. There are actually three indispensable elements in urban renewal. They are conservation, rehabilitation and rebuilding. This would mean an indentification of the areas or buildings worth preserving, a programme to improve such areas and make them habitable with an improved environment including roads, carparking facilities, the provision of amenities and the contruction of a variety of commercial buildings which necessitates the investment of private capital and also of providing better employment opportunities.

Singapore, like many other cities, has its share of the problems such as central area slums, squatter shacks, obsolete over-crowded and blighted areas. One of the main tasks of urban renewal, especially in the initial stages, is to redevelop the obsolete and dilapidated properties in the centre of the city. Preservation of an area or building may be for historical reasons, so as to make the best possible use of the limited and valuable land space available. A significant development was the decision of the government to sell to private investors (local and foreign) chosen sites, strategically located in the central areas, suitable for a wide range of economic projects such as hotel development, restaurants, amusement centres, and luxury apartments. The aim is to achieve a balanced development in the central areas, and eventually to create a more dynamic city (Choe, 1969).

Singapore was ready by 1966 to embark on a comprehensive programme of urban renewal. The area chosen is in close proximity to the port on which Singapore's growth as a regional and international trading centre has largely been based. This area extends about three miles along the

waterfront on either side of the Singapore River estuary (North or South) and about a mile inland. Altogether, an area of about 1,700 acres (2.65 square miles) constitutes 1.2 per cent of the total land area in the republic and houses approximately 25 per cent of the total population (H.D.B., 1970a). For the purposes of urban renewal, the whole of the central area in Singapore has been devided into 19 precincts; eleven north of the Singapore River (designated N.1 to N.11) and eight to the south (designated S.1 to S.8). Each precinct is numbered according to development priority, this being determined by availability of land, the stage of deterioration reached by the property in the area, the need of the land for development or for road, public utility, amenity improvements and the extent to which it fits in with the plan for comprehensive renewal (Map 8.1).

The two precincts selected for early development in the Housing Development Board's Second Five-Year Programme are N.1 and S.1. Apart from the considerations mentioned above, the idea of starting work in two separate areas in the extreme north and extreme south of the city is to launch a sort of two-pronged attack converging eventually on the central business district itself. S.1 and N.1 are slum areas with dense population density, the buildings are over a hundred years old and lacking in basic sanitary facilities. Both S.1 and N.1 are near two Satellite Towns, Queentown and Toa Payoh respectively. Thus the population and shops can be moved to these towns without causing serious disruption or splitting up the families. It is also the intention to preserve wherever possible buildings of historic or architectural interest, and to preserve and rehabilitate selected areas which would serve as tourist attractions where suitable buildings will be restored and converted to preserve their essential character. In 1969, 5,000 units of flats and 1,300 shops had been completed in these two precincts. Under construction are an additional 3,038 units of flats and shops. Approximately 85 per cent of the land has already been acquired and 65 per cent of the site has been cleared and prepared for construction. It is evisaged that renewal on these two precincts would be either fully completed or nearing



MAP 8.1 : URBAN RENEWAL IN THE CENTRAL AREA

completion by the end of 1970(Choe, 1969). The estimated cost of both N.1 and S.1 is $150 millions, to be spent up to 1970. Nevertheless, on accomplishment of these projects, much experience can be gained for further urban renewal schemes (Jensen, 1967).

(i) Precinct South 1 Redevelopment

Precinct South 1 comprises approximately 180 acres of land and is bounded by Outram Road, Havelock Road and New Bridge Road. Various public and private buildings are to be retained or renovated and integrated into the planned redevelopment. These include several schools, the ministry of Labour Building and the Majestic Theatre. Active renewal of this precinct started in 1964. During 1966, three contracts had been completed; the first contract of the comprehensive plan for precinct S.1 was completed. This was the precinct S.1 contract one, Bukit Ban Kee Redevelopment, comprising 534 one-room improved flats with 12 shops. Beside the completion of this first contract, tenders were called for contract two, Pard Road Redevelopment, comprising 364 shops and 130 flats. Contract three, Outram Road Redevelopment, comprised 419 shops and 864 flats (Choe, 1969). In 1969, Public Housing Projects had been completed at Precinct South 1 and 3,000 units of flats, 1,000 shops and stalls, one market, two multi-storey car-parks (800 cars) were under construction. Private development projects under construction comprise three hotels at Havelock Road and Outram Road, one office block at Chin Swee Road, and one shopping and residential complex at the former People's Park site (H.D.B.a, 1970).

It is proposed to build 7,700 new residential units together with multi-level shopping, carparking, offices, cinemas, restaurants, schools, playgrounds and other community amenities. In addition, private enterprise has also been invited to participate in the redevelopment of this area, because much of the land is already in state ownership. For example, the People's Park project is a three-level shopping centre with apartments on top. The roof deck of the shops is used as a crêche and

for recreational purposes. The affected families and businesses are allowed special rentals to assist them to be relocated into this new building. This shopping complex and apartments under the Singapore Government's urban renewal scheme have been earmarked for development by private enterprise and government is inviting tenders to buy the sites on 99-year leases and carry out the development. In general, shop-tenants in this new shopping complex pay a much lower rental than average, although most of the shops are also small in size.

(ii) Precinct North 1 Redevelopment:

The north precinct occupies an area of approximately 90 acres bounded by Crawford Street, Beach Road, Jalan Sultan, Victoria Street and Kallang Road. It is characterised by two-storey and three-storey building, totally lacking in essential amenities and ripe for demolition. Work on this precinct started in 1965 involving as well as multi-storey apartments building, shopping arcades, office buildings, cinemas, schools, car parking station, pedestrian walkways, government and institutional buildings, playgrounds and parks; an existing mosque will be retained and the area round it landscaped as part of the overall plan. By the end of 1969, one large contract was completed by the Board, while two others were nearing completion. Together they would yield a total of 2,000 units of flats, 300 shops and stalls, two emporia, one sub-basement car-park for 450 cars. North1, another major area in the Board's second five-year development plan, lies between the Kallang River Mouth and the Old Beach Road slightly north-east of the city. Housing Development Board tenants have now moved into three blocks of 16-storey buildings, containing 113 two-room flats, 28 three-room flats, 15 shops and a restaurant (H.D.B.b, 1969).

(iii) Other Precincts

An area in Kallang Park and along the proposed "Golden Mile" between Beach Road and Nicol Highway will be used for the development

Plate 8.1: Part of the Precinct South One in the Urban Renewal Project

Plate 8.2: Redeveloped Housing Estate in Precinct North One

of high quality apartments, shopping complexes, hotels, restaurants and recreation, entertainment and exhibition centres which will transform the seafront. This development will involve the participation of the private sector. As the renewal process moves towards the Central Business District around the Singapore River there will be a greater emphasis on conservation and rehabilitation rather than reconstruction, and also greater participation by private enterprise. Further along the harbour frontage at Collyer Quay a multi-storey car park has recently been built with a restaurant and shops. This provides a direct link from the Raffles Place shopping area to Clifford Pier and make it possible to continue the walk from there, through landscaped settings, to Kallang Park. One of the most ambitious projects undertaken by the Singapore Government in its efforts to promote tourism is the development of the 700 acre island at Sentosa. The island, with its unrivalled natural beauty, fine beaches and proximity to the Central Business District of Singapore, will be totally utilised for the development of tourism (H.D.B.a, 1970). Access to the island will be by comfortable ferries and a cable car. The Sentosa Development Corporation's first annual report (for the 1972-73 period) gave details of 20 other projects for the island. They include a ferry terminal, a plaza, a tourists' malay and Chinese village, a plant nursery, "an old Singapore", a shopping complex, aviary, artists' village, hotels, maritime museum, aquatic park and water villages and a pirates' cove. In addition cottage industries will be stimulated on the island and there will be ample opportunity for sports and entertainment.

Plate 8.3: A Section of the People's Park Complex in the Urban Renewal Project

Plate 8.4: Part of the Golden Mile Along Nicoll Highway under the Urban Renewal Programme

SUMMARY AND CONCLUSIONS

In 1819, when Stamford Raffles landed in Singapore, the population was less than 200. Today, Singapore has attained the status of a metropolis with a population of over two million. This rapid population growth has changed a small fishing village into a great port, trading and industrial centre. Today, among the South-East Asian countries, Singapore has the best public housing, reclamation projects and urban renewal programmes. Population and urban development in Singapore show that Raffles was right when he picked this spot at the southern end of the Malay Peninsula.

A summary of the major finding from the population, housing, reclamation project and urban renewal programmes discussed earlier are as follows:

(i) According to survey estimates, the population of Singapore had a growth rate of 3 to 4 per cent before 1960; the main factor of this growth were natural factors and a liberal immigration policy. After 1960, the average annual population growth rate dropped to between 1.5 and 2.8 per cent, as result of Singapore's success in family planning and birth control (Table 2.1).

(ii) The sex ratio of the population has become nearly balanced; in 1969 there were 1,065 males per 1,000 females (Table 3.1). Of the main ethnic groups, the Malays and Chinese had a fairly even sex distribution of 1,036 and 1,017 per thousand respectively. The Indians however still have a less balanced sex ratio of 1,518 males per thousand females, largely the effects of their past migratory pattern (Table 3.2). About 66 per cent are under the age of 29 and only 5.7 per cent age over 60 (Table 3.3); due to this high natural growth rate, Singapore's population is a young population, with a large proportion in the young dependent age groups. This means a need to provide for rapid employment opportunities to match the influx into the market.

(iii) As regards economic characteristics of the population, based on the 1966 census (Table 4.1), out of the whole population of Singapore with age above 10, about 42.1 per cent are economically active, the remaining

57.9 per cent being economically inactive. Out of the male population 35.6 per cent are economically inactive, compared to a higher female percentage of 80.2. This is due to the fact that half of the female population are classified as economically inactive houseworkers, moreover, there are more females among the old people. The industrial and occupational classifications of the labour force from 1957 to 1966 census indicate that an increasing proportion of the economically active persons are engaged in the secondary industries (20.8 per cent compared to 25.6 per cent); in Table 4.6 we can also see professional, technical and related workers and craftsman, production process workers were increased to 6.5 and 27.1 per cent from 4.8 and 1.3 per cent respectively. This is a result of the government's encouragement of rapid industrialization. A declining proportion is engaged in primary industries, because mining and agriculture were decreasing in importance. The tertiary industries have declined only slightly because entrepot trade in Singapore was still growing.

(iv) When the sex ratio improved with the arrival of a large number of Chinese women in the 1930's, more and more migrants turned into permanent settlers and all the characteristics of slum living became pronounced; after 1960, the Singapore government began undertaking substantial public housing, urban renewal and reclamation programmes. It is estimated that about half a million or 37 per cent (1971) of Singapore's total population are living in low-cost homes managed by the Housing and Development Board (Table 5.2).

(v) Rapid commercial and population growth have resulted in a much more intensive use of Singapore's limited land resources. This in turn caused the urban core of Singapore to deteriorate rapidly into slums. A large programme for urban renewal and redevelopment has certainly assisted the much needed commercial development and revitalization of the central city area. Most of the residential neighbourhoods such as Queenstown and Toa Payoh are situated within a five-mile radius of the heart of the city. The aim of these programmes is to solve the housing problem of the low income sections the population living in congested slums and in squatter areas, and to relieve overcrowding in the urban

areas, and also to rehouse the people affected by urban renewal in the central areas. Urban renewal programmes also helped to alleviate the problem of unemployment and are part of an overall effort to make Singapore more attractive to tourists. Around this central part industrially self-contained satellite towns in Jurong industrial estate were equipped with factory sites and public housing for the factory workers and their familes. Extending from the central city area to Kallang Basin Reclamation in the North and to the East Coast Reclamation in the East, these extensive reclamation of swamps and coastal areas have provided additional land, not only for housing but also for communications and for industrial estates.

Singapore faces a variety of urban problems; because of rapid growth of population, it has been necessary to introduce public housing, urban renewal and reclamation programmes. Future development in Singapore will have to take into consideration such problems as employment, water supply, road systems and limited available land.

The population at the end of 1960 passed the figure of 1,600,000 and was estimated to reach two million by 1970; expected population will have increased up to three million by 1980. The target of the Singapore National Family Planning and Population Programme is to reduce the annual fertility rate, and rate of population increase is expected to be reduced to 1 per cent by 1980. Thus, Singapore must as a matter of survival achieve as soon as possible the two-child family. In housing estates, according to ~~Figure~~ Table 5.2 during 1960 9 per cent of the population living in Housing Development Board flats, and 37.4 per cent lived in public housing by 1971; it is expected that nearly 80 per cent of the population will be living in the public housing flats by 1980. In recent years the average family has four children; in future, the family is expected to be noticeably smaller. Public housing also has produced a change in life styles; living inside a flat is in fact a kind of self-imposed isolation from one's neighbours. Behind the closed doors each individual flat imprisons a small aggregate of people who are relatively unknown

to their neighbours. Again, with the increase in the number of multi-storied flats, the problems of noise by neighbours, traffic and factories can affect the living environment of Singapore's community. The considerate attitude of individuals could help to overcome this problem, but in practice it may not be so easily solved. Three large satellite towns - Queenstown and Toa Payoh and Jurong, an industrial new town - will be all completed during the Third Five-Year Programme, and development will commence in three other satellite towns in Telok Blangal, Bedok and Woodlands. After 1980, the shift in emphasis will be to the north and to the new industrial nuclei of Sembawang and Seletar.

The employment structure within the housing estates is expected to be fundamentally changed in the future. In the past most people were employed in the service and commercial sectors. However, Singapore can no longer depend mainly on the commercial sector to provide employment for the rapidly growing population. The solution to the unemployment problem must be found in industrialisation which is regarded as the major means by which to solved the employment problem and to provide new jobs for those coming of age and entering the job market. In addition, further employment opportunities could be created in all sectors of a multi-economy in commerce, trade, administration, tourism and other service industries. Due to the increase in population and industrial development, greater water supplies are required,but already there are serious problems of contamination in some of Singapore's reservoirs from drains and streams; in addition, seasonal lack of sufficient rains is often a problem. Singapore therefore remains dependent upon South Johore for at least 70 per cent of its water supply, but it is unwise to rely another country (Malaysia). One way to solve this problems is to build desalinization plants.

A further point which should be made concerns the future urban transportation problem. The increase in population and public housing is leading to severe problems of traffic congestion and inadequate car-parking facilities. The measures available to tackle road system

problems are many and varied. One of the measures is aimed at controlling or restricting the use of private motor vehicles. A second way is to improve traffic flow on the roads by one-way streets and by express services from every satellite towns to the city centre. Finally, the Pan-Island Expressway will link new housing and industrial estates to one another: the East Coast Reclamation will carry a six-lane expressway and a section of the Pan-Island Expressway already under construction, and scheduled for completion in 1975. This is, however, only a temporary solution to Singapore's traffic problems. In future, the Pan-Island Expressway could be extended further by constructing an undersea tunnel or bridge from Changi to Pulau Ubin and Pulau Tekong in the North-east part, and another from Tanjong Pagar to Pulau Brani and Pulau Sentosa in the South part. By doing so, Singapore could reduce the traffic intensity and as well as encourage development of these small island. The parking problem of housing estates and the city centre is increasing. Associated with the general increase in income and standard of living, the motor car is becoming a common item of possession. The housing estate, where the carparks appeared to be adequate a few years ago when the tenants moved in, are now completely congested. One way to solve the parking problem is to build multi-storey parks within the estate and to charge for reserved parking if necessary; in addition, private car parking in the city centre could be restricted, or even prohibited.

In spite of reclamation schemes under way and plans for more efficient intensive land use, these programmes are only a temporary solution. The island of Singapore is to all intents and purposes incapable of being expanded, and standards of living space, as well as recreation area, are likely to be seriously diminished unless ~~there is~~ even more rigid policies of immigration control and family planning are implemented.

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GLOSSARY OF MALAY TERMS

Ayer	Water
Besar	Big
Bukit	Hill
Chawan	Tea saucer
Jaga	Watchmen
Jalan	Avenue, Road, Way
Jurong	Corner
Kandang	Fenced enclosure for animals
Karang	Coral tail
Kechil	Small
Kerbau	Buffalo
Lebar	Wide
Merah	Red
Pagar	Palisade, Fence
Panjang	Length, Long
Pasir	Sand
Paya	Swamp
Payoh	Slender
Pesek	Flat
Seletar	All round
Sentosa	Interestingly, the Singapore Government saw fit to change the name of this island in 1971 from the original name of Blakang Mati, which can roughly be translated from the Malay as 'Beyond Lies Death' to Sentosa, which means 'Peace or Tranquility' in Malay.
Sungei	River
Tanah	Land
Tanjong	Cape
Tekong	Navigating Officer of a Junk
Timah	Tin
Toa	The game of fan-tan
Tongkang	Draft barge or cargo-boat
Tukang	A blacksmith
Ubin	Granite
Ulu	Port